The University Of Sheffield.

Assessing the Implications of Brexit for Evidence, Expertise and Agri-food Regulatory Governance in the UK.

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Abstract

The decision by the United Kingdom (UK) to leave the European Union (EU) after nearly five decades of membership (Brexit) presents numerous implications for the UK's agri-food sector. The EU, over the decades, evolved into a regulatory state, with its rules and institutions dictating most of the activities in the UK's agri-food sector. EU policies and regulations, such as the Common Agricultural Policy (CAP), controlled most of the agri-food activities in the UK, from agronomy to trade. EU institutions such as the European Food Safety Agency (EFSA) were also responsible for producing scientific evidence and setting standards for the sector. Consequently, Brexit has major implications for the future trajectory of the UK's agri-food sector.

Brexit also represents a novel case for EU studies and (dis)integration literature since this is the only time a member state has left the Union. Thus, a new methodological and analytical framework is warranted to explain the future relationship between the EU and its former member. This thesis refines the concepts of de-Europeanisation, dismantling, the Brussels effect, and global factors to provide a novel analytical framework to analyse the post-Brexit regulatory relationships between the EU and the UK. It analyses the drivers and constraints for the UK dismantling EU regulations and/or divergence from the EU's regulatory regimes. It also examines the capacity of the UK's scientific advisory and regulatory institutions to ensure sustainability in the agri-food sector post-Brexit.

The thesis concludes that Brexit and the new UK-EU agreements give the UK the autonomy to diverge from the EU's agri-food regulatory regimes. However, the larger market size of the EU, path dependencies such as high supply chain linkages, and some aspects of the UK-EU Trade and Cooperation Agreement (TCA) will reinforce the so-called 'Brussels effect' to draw the UK close to the EU.

Declaration

I, **George Asiamah**, confirm that the thesis is my own work. I am aware of the University's Guidance on the Use of Unfair Means (www.sheffield.ac.uk/ssid/unfair-means). This work has not previously been presented for an award at this or any other university. Information and quotations from other works have been acknowledged, and references have been provided in the footnotes or in the list of references.

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List of Abbreviations

(v)CJD	(Variant) Creutzfeldt-Jakob Disease
ACP	Advisory Committee on Pesticides
AGP	Antibiotic Growth Promoter
AHAW	Animal Health and Welfare
AIC	Agricultural Industries Confederation
AMR	Antimicrobial Resistance
ASOA	Alliance to Save Our Antibiotics
BEUC	Bureau Européen des Unions de Consommateurs
BPC	British Poultry Council
BSE	Bovine Spongiform Encephalopathy
BVA	British Veterinary Association
C&C	Command and Control
CAP	Common Agricultural Policy
CI	Consensual Instrument
CIEH	Chartered Institute of Environmental Health
CJEU	Court of Justice of the European Union
COPR	Control of Pesticide Regulations
CPA	Crop Protection Association
CR	Critical Realism
CRD	Chemicals Regulation Directorate
CSA	Chief Scientific Adviser
CSO	Civil Society Organisation
CXL	Codex Maximum Residue Limit
DDT	Dichlorodiphenyltrichloroethane
DEFRA	Department of Environment, Food and Rural Affairs
DNOC	Dinitro-orthocresol
DoE	Department of Environment
DoH	Department of Health
EARS-Net	European Antimicrobial Resistance Surveillance Network
EC	European Commission
ECA	European Communities Act
ECDC	European Centre for Disease Control
ECI	European Citizens Initiative
ECP	Expert Committee on Pesticides
EEC	European Economic Community
EFSA	European Food Safety
EI	Economic Instrument
EMA	European Medicines Agency
ESVAC	European Surveillance of Veterinary Antimicrobial Consumption
EU	European Union
EUWA	European Union Withdrawal Act
FAO	Food and Agriculture Organisation
FAWC	Farm Animal Welfare Council
FEPA	Food and Environment Protection Act
FoE	Friends of the Earth
FSA	Food Standards Agency
FSS	Food Standards Scotland
FTA	Free Trade Agreement
GAEC	Good Agricultural and Environmental Conditions
GB	Great Britain
GDP	Gross Domestic Product
GM(O)	Genetically Modified (Organism)
HI	Historical Institutionalism

HMA	Head of Medicines Agencies
HSE	Health and Safety Agency
IAH	Institute of Animal Health
INFOSAN	International Food Safety Authorities Network
IPPC	Intergovernmental Panel on Climate Change
LPF	Level Playing Field
MAFF	Ministry of Agriculture, Fisheries and Food
MBM	Meat and Bone Meal
MRL	Maximum Residue Limit
nACHRs	Nicotinic acetylcholine receptors
NDPB	Non-Departmental Public Body
NFU	National Farmers' Union
NI	Northern Ireland
NPU	Neuropathogenesis Unit
OECD	Organisation of Economic Cooperation and Development
OIE	Office International des Epizooties
PAN	Pesticide Action Network
PHLS	Public Health Laboratory Service
PPP	Plant Protection Products
PPR	Panel Plant Protection Products and their Residues
PRiF	Pesticides Residues in Food
PRT	Pathogen Reduction Treatment
PSN	Pesticide Steering Network
PSPS	Pesticides Safety Precautions Schemes
R&D	Research and Development
RASFF	Rapid Alert System for Food and Feed
RCI	Rational Choice Institutionalism
RMS	Rapporteur Member State
ROI	Republic of Ireland
RSPB	Royal Society for the Protection of Birds
RUMA	Responsible Use of Medicines in Agriculture
SAC	Science Advisory Council
SEA	Single European Act
SEAC	Spongiform Encephalopathy Advisory Committee
SI	Sociological Institutionalism
SMR	Statutory Management Requirements
SPS	Sanitary and Phytosanitary
STS	Science and Technology Studies
TBT	Technical Barriers to Trade
TCA	Trade and Cooperation Agreement
TRACES	Trade Control and Expert System
UK	United Kingdom
UKRI	UK Research and Innovation
UNEP	United Nations Environment Programme
US(A)	United States (of America)
VMD	Veterinary Medicines Directorate
VPC	Veterinary Products Committee
WHO	World Health Organisation
WTO	World Trade Organisation

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CHAPTER ONE: INTRODUCTION

1.1 Research Overview

This interdisciplinary project embodies three main research themes: Brexit, scientific expertise, and agri-food regulatory governance. The project traces and analyses the broader implications of Brexit for agri-food regulatory regimes and governance in the United Kingdom (UK). This involves tracing the evolution of the scientific advisory and regulatory policy landscape in the UK and how European Union (EU) membership affected them. The project also analyses the European Union Withdrawal Act (EUWA), the Northern Ireland Protocol (NI Protocol) and the new UK-EU Trade and Cooperation Agreement (UK-EU TCA), and their implications for the post-Brexit regulatory relationship between the UK and the EU. Finally, it assesses the capacities of domestic scientific institutions and the post-Brexit challenges and opportunities for evidence-informed agri-food policymaking in the UK.

Using new institutionalism as the overarching theoretical framework, the study engages other theories and concepts: (de)Europeanisation, the Brussels Effect and Co-production, to examine the evolving regulatory relationship between the UK and the EU and its implication for the sustainability of the agri-food sector. The study uses three main regulatory regimes and policy decisions as case studies: the Food Safety regulatory regime (pathogen reduction treatment ban), the Animal Health and Welfare regulatory regime (restrictions on antibiotics), and the Plant Protection Products (PPP) regulatory regime (neonicotinoid restrictions). These cases were selected to cover the broad spectrum of the agri-food system, from cultivating plants and rearing livestock to food preservation and treatment. They also represent regulatory cases where the EU currently differs from other major trading partners of the UK. Therefore, they serve as typical cases to examine post-Brexit regulatory politics in terms of possible regulatory convergence or divergence from the EU.

1.2 Background and Context

The United Kingdom (UK) joined the European Union (EU) – the then European Communities (EC) – as a member state in 1973. As a member state, EU rules and policies affected the UK's agri-food sector in several ways. The Common Agricultural Policy (CAP), the Communities' flagship programme, dictated most of the agri-food-related activities, from agronomy to trade. The Single European Act 1986 – which aimed to establish the EU single market – and the vision for a Common Organisation of Agricultural Markets (Nugent, 2017; Garzon, 2006) necessitated the harmonisation of the UK's agri-food regulatory regimes with the EU (Levi-Faur, 2013; Lodge, 2008; Thatcher & Coen, 2008; Majone, 1994). The EU's regulatory space expanded from developing regulations and policy directives to the creation of supranational regulatory agencies such as the European Food Safety Authority (EFSA) (Nugent, 2017; Levidow & Carr, S. 2007; Gilardi, 2002). The harmonisation of regulatory standards also led to a considerable diversion of markets from third countries and the creation of markets and supply chain linkages among EU member states (Seidel, 2019; Spoerer, 2011).

In 2016, the UK voted in a referendum to leave the EU, which is popularly referred to as 'Brexit'. Following the referendum, the UK parliament passed the European Union Withdrawal Act (EUWA)[1] to repeal the European Communities Act 1972. The EUWA ended the supremacy of EU rules and regulations and the competence of EU institutions to legislate for the UK. The changing relationship between the EU and the UK presents wide-ranging questions and complex challenges for agri-food regulatory governance in the UK. For instance, it is unclear the extent to which the UK will continue to align or diverge from the EU regulatory structures and mechanisms. However, since the EU market is guided by EU rules and regulations, the possible divergence or alignment will have an impact on post-Brexit trade relations and the broader sustainability of the UK's agri-food sector.

[1] See Section 6.2.1 for a detailed explanation of the EUWA

Scientific expertise and evidence are also relevant to this discussion for two interrelated reasons. First, with the increasing complexity and pervasiveness of technology across agri-food value chains, scientific knowledge and expertise are now considered a *sine qua non* to setting standards and regulatory decision-making (Wilsdon et al., 2015; Grundmann & Stehr, 2012; Doern & Reed, 2000). Expert advice and evidence are sought on a broad spectrum of topics in the sector – from food safety and quality, animal health and welfare, to environmental quality. Scientific institutions and expertise will, thus, play a crucial role in post-Brexit regulatory relationships – in the setting of common standards and adjudication of trade disputes. Moreover, decades of regulatory integration led to a delegation of risk assessment, authorisation, approval, and related functions to EU supranational institutions (Levidow & Carr, 2007; Falkner et al., 2005; Majone, 1994). The EFSA, for instance, has overseen considerable aspects of safety risk assessment and authorisation of products – including pre-market approval for additives, enzymes and GM food and feeds (Berthe et al., 2012; Borras et al., 2007). The European Medicines Agency (EMA) also managed the assessment of medicinal products and residues for products marketed within the EU (Borras et al., 2007). A withdrawal from these advisory and regulatory setups could disrupt the UK's advisory system, at least in the short term (Wilsdon, 2017).

Moreover, building an effective advisory system for post-Brexit agri-food governance will entail addressing the supply, demand and integration challenges that may arise due to the transfer of regulatory competence from the EU. On the supply side, there is a need to strengthen the institutional capacity of departments and agencies to provide credible evidence to support regulatory decisions (Wilsdon et al., 2015; Rodrigo et al., 2009). Also, due to the increasing globalisation of the agri-food system, most challenges in the sector are transnational – requiring scientific cooperation across administrative boundaries (Higgins & Lawrence, 2007). Over the years, the EU has played a facilitating role by linking researchers and different pieces of scientific infrastructure across member states. Disconnection from these infrastructures could weaken the UK's institutional capacity (Wilsdon, 2017).

The growing complexity in the agri-food sector has also made almost every issue that calls for the adjudication of science to be in the domains of post-normal science.[2] Experts often spend most time engaging in debates on the right procedures and standards (Wilsdon et al., 2015). The challenge of scientific uncertainty and policy ambiguities have intensified the 'politicisation of expertise' – that is, the politics of counter-expertise (Pielke, 2007) – in the regulatory space. As Pielke (2007:4) put it, 'the battle of interest among actors in the regulatory space now takes place under the guise of science'. This challenge is critical in post-Brexit agri-food regulatory governance discussions due to the contentions and complaints from different stakeholders and the rise of policy entrepreneurs within the sector (Downing et al., 2018; Mathews, 2016). For instance, there exist several food safety regulatory differences – including regulations on Genetically Modified (GM) organisms and products and the use of hormones in farm animals – between the UK and the US, which have become critical issues in prospective trade arrangements between the two countries (BBC, 2019). The need to devise measures to address ambiguities and normative challenges is crucial to enhance legitimacy, credibility, and trust in the post-Brexit advisory system.

This research draws on the literature and concepts from politics, policy studies, geography, and science and technology studies (STS) to examine the theoretical and practical implications of Brexit for agri-food regulatory decision-making in the UK. It analyses the changing dynamics of advisory structures and the transfer of regulatory competence from EU agencies to the UK. It further examines the opportunities, constraints and challenges of diverging or aligning with the EU's regulatory regimes. This includes an examination of the perspectives of the major stakeholders and policy actors, the pressure from the EU (the Brussels Effect), domestic institutional constraints, and global drivers.

The thesis argues that the decades of regulatory harmonisation with the EU may necessarily have created institutional paths which could affect the preferences of domestic stakeholders

[2] Post-normal science refers to policy situations where facts are uncertain, values are in dispute, stakes are high, and decisions are urgent (Funtowicz & Ravetz, 1993).

and the core structures of UK regimes to remain aligned with the EU. Further, it highlights the 'temporality' of institutional variables – meaning, institutional factors vary across time –, and thus, changes in these variables, including domestic stakeholders' views and preferences, will affect the decision to align or diverge from the EU's regulatory regimes. The thesis also stresses on the rise of EU as global regulatory hegemon (the Brussels Effect) and the pressure it exerts on non-member states to adopt its rules and practices. It emphasises that the historical, economic and geographical proximity of the UK to the EU will cause the Brussels Effect to be stronger on the UK than other non-member countries. Additionally, the thesis contends that, in cases where there exist differences in principles and practices between the EU and other major trading partners of the UK, the dismantling decision will depend mainly on the stringency of the EU regulations.

1.3 Research Aim, Objectives, and Questions

The overall aim of the research is to assess the likely implications of Brexit for the advisory and regulatory landscape for agri-food governance in the UK. The project seeks to achieve its core objectives and answer the associated research questions using selected cases from the agri-food sector. Thus, it aims:

1. To examine the challenges and opportunities that Brexit presents to existing advisory and regulatory regimes for agri-food governance in the UK.

   Associated Research Question(s):

   a. What are the existing structures and capacity of scientific agencies responsible for producing evidence and undertaking risk assessment in support of agri-food regulatory decision-making in the UK?

   b. How can the structures (identified in 3a) be strengthened to provide timely and credible advice – to ensure sustainability in the post-Brexit agri-food sector?

2. To analyse the challenges and the possibilities to enhance the production, integration, and use of evidence in the post-Brexit agri-food regulatory decisions in the UK.

   Associated Research Question(s):

   a. What are the sources and causes of ambiguity and normative challenges in the selected regulatory cases: Neonicotinoid ban, PRT, AMR?

   b. What practical measures could be adopted to address the challenges (identified in 3a) to enhance the credibility, legitimacy, and trust in post-Brexit advisory systems in the UK?

3. To trace and analyse the impact of EU membership on advisory and regulatory structures for agri-food governance in the UK.

   Associated Research Question(s):

   a. How has the advisory system for agri-food regulatory governance in the UK evolved since the Single European Act in 1986?

   b. What have been the effects of EU membership and the harmonisation of regimes on institutional arrangements, norms, and practices of agri-food governance in the UK?

4. To assess the implications of the new UK-EU relationship on prospective regimes for agri-food governance and sustainability in the UK.

   Associated Research Question(s):

   a. To what extent does the EUWA, NI Protocol and the UK-EU TCA permit the UK to align or diverge from EU regulatory structures?

   b. What are the possible constraints, drivers, opportunities and challenges for future alignment or divergence from EU's regulatory regimes?

1.4 Research Significance and Novel Contributions

This research was conducted when advisory and regulatory systems for agri-food governance in the UK were experiencing significant turbulence as a result of Brexit. First, the EUWA repealing the European Communities Act 1972 meant that EU advisory and regulatory institutions ceased to have authority in the UK's jurisdiction. Regulatory responsibilities such as risk assessments, evidence brokerage, and authorisation of products transferred to EU agencies would be reverted to UK domestic institutions. The UK, therefore, needs to foster domestic capacities and structures in areas where it previously relied on the EU. Also, given that EU standards guide the common market, the extent of alignment or divergence from the EU regulatory framework will shape future trade relationships between the two blocs. Therefore, a research project that critically assesses the broad impacts of Brexit on regulatory governance is imperative to the design of sustainable agri-food systems in the UK post-Brexit.

Whilst a burgeoning literature that seeks to assess the impact of Brexit on the various sectors in the UK has emerged since the referendum (Cygan, 2020; Zito et al., 2019; Burns et al., 2019), none of it yet pays detailed attention to expertise, evidence, and regulatory governance. This thesis, thus, serves as one of the first pieces of research to provide an extensive analysis of the overall implications of Brexit for advisory systems and agri-food governance in the UK. It analyses how the decades of EU membership and harmonisation of regulatory mechanisms affected the UK's domestic advisory system for agri-food governance. It also assesses the current institutional capacity of the UK's scientific and regulatory agencies and the challenges that may arise from taking additional responsibilities from the EU. Finally, it examines the possible drivers, constraints, and implications of divergence for the sustainability of the agri-food sector. The analysis, results and recommendations of this project are timely and vital to the designing of post-Brexit advisory and regulatory systems in the UK.

The thesis also makes empirical contributions to Science and Technology Studies (STS) and the 'evidence-informed policymaking' literature. Moving from the technocratic and linear models, many scholars now recognise the complex interrelationship between evidence and

policy (Gluckman & Wilsdon, 2016; Cairney, 2016; Pielke, 2007; Jasanoff, 2005; 2004). As Jasanoff (2005; 2004) explains, evidence, policy and public reasoning are co-produced in a socio-cultural and economic environment where regulatory issues and societal norms are mutually constitutive. Evidence that informs regulatory decisions operates alongside a broad milieu of economic, moral, social, and political considerations. These institutional parameters affect the framing of regulatory issues and the proposition of policy solutions. At present, the majority of studies that explore the influence of institutional factors on the evidence-policy landscape focus on the spatial dimensions. For example, most works focus on transatlantic regulatory differences between the EU and the US (Lalor & Wall, 2011; Drezner, 2005; Jasanoff, 2005; 2004; 2002; Löfstedt & Vogel, 2002). Meanwhile, emerging studies have shown that institutional variables are 'spatiotemporal', which means institutional variables vary according to both space and time (Liu & Guo, 2019; Yuan et al., 2018). This thesis forges ahead to use Brexit as a typical case to provide an empirical analysis of the spatiotemporal dynamics of the informal institutional variables and how they affect the framing, production, and integration of evidence in regulatory decisions.

The thesis also makes theoretical and methodological contributions to the literature on (dis)integration, (de)Europeanisation and EU external governance. Firstly, there are currently two main bodies of literature and theories that seek to explain the EU's relationship and influence on other countries. Europeanisation (Bulmer, 2008; Bache, 2008a; Featherstone & Radaelli, 2003; Borzel & Risse, 2003), which focuses on the EU's influence on member states; and Brusselisation (Barbé et al., 2009) or the Brussels' effect (Bradford, 2012; Bradford, 2020), which emphasises the EU's influence on non-member countries. However, Brexit represents a novel case of de-membership and, thus, warrants a new analytical framework.

Recent scholars (Cygan, 2020; Burns et al. 2019; Armstrong 2018) have used de-Europeanisation and dismantling to explain the possible future trajectory of the emerging regimes and the post-Brexit regulatory relationship between the UK and the EU. While maintaining the historical institutional approach adopted by these scholars, this research

highlights the significance of actor-oriented institutional variables, such as socio-economic rationality, spatial dependency, and propinquity, as mediating factors for future regulatory relations. The thesis connects and refines the concepts of de-Europeanisation, dismantling, Brussels Effect and global opportunities and constraints to provide a novel analytical framework to analyse bilateral regulatory relationships between the EU and the UK (a former member). The new framework will aid in making analytical comparisons and generalisations on the possible exit or accession of other countries.

Also, most of the emerging literature on EU (dis)integration conceptualises de-Europeanisation as a 'mirror image' (Müller et al., 2021) or a 'reverse process' of Europeanisation (Gänzle et al. 2019; Domaradzki 2019; Gravey and Jordan 2016; Gravey 2016). However, Schimmelfennig (2015: 1159) has demonstrated that depending on the scope and depth of harmonisation, European integration may produce unintended or spillover effects. Consequently, this thesis argues that the spillovers from European integration can affect the preferences of stakeholders and the core structures of domestic regimes, which could in turn affect the path and the process of de-Europeanisation so that they do not 'mirror' the path of Europeanisation. The thesis uses Brexit as a reference point or the 'mirror line', to examine whether the possibilities and the tendencies for de-Europeanisation of UK's agri-food regulatory regimes follow the reverse path of the Europeanisation process.

Also, while several early studies on Brexit and de-Europeanisation have focussed on environmental policy and governance (Zito et al., 2019; Burns et al., 2020), there has been less analysis of the agri-food sector (Murphy, 2019). Yet, the agri-food sector remains one of the critical areas in the UK economy, which is heavily aligned with EU procedures. This project, therefore, provides one of the first extensive analyses of Brexit, de-Europeanisation, and agri-food regulatory regimes. Lastly, the thesis uses original data gathered through in-depth interviews, which depict the current perspectives of key stakeholders in the agri-food sector. The analysis will, thus, stand as an essential point of reference to future longitudinal studies on pre-and post-Brexit UK-EU regulatory relations.

1.5 Thesis Structure

This introductory chapter has presented the overview, the research background, the broad aim, objectives, and the research questions addressed in the thesis. It has also highlighted the significance and the novel contributions to the literature on STS, (de)Europeanisation and EU external governance. The remainder of the thesis is structured into seven further chapters. Chapter two presents the conceptualisation of the agri-food system and the institutionalisation of expertise and evidence in regulatory governance. Chapter three provides an in-depth review of the literature and theoretical approaches. Chapter four describes and reflects on the research design and methodological and analytical approaches employed to conduct the research. It also provides the value of a case-study approach, the descriptions, and the justification for selecting each case.

The empirical chapters (chapters five to seven) are presented in an 'alternative' rather than the 'traditional' thesis format. Thus, each of the chapters is presented as a distinct but coherent publishable paper. Chapter five discusses the potential challenges for scientific advice and evidence for post-Brexit agri-food governance. Chapter six creates a substantive narrative and deep understanding of the evolution of agri-food regulatory regimes in the UK. It presents the historical development of food safety, AHAW and pesticide regulatory regimes, highlighting the key events and the impacts of EU regulatory activities on domestic polities, politics, and policies. Chapter seven presents the findings on the possibilities of dismantling or de-Europeanisation of the UK's agri-food regulatory regimes. It includes the assessment of the perspectives and preferences of current stakeholders, the internal and external institutional constraints and drivers, and the possible effects of dismantling. Finally, chapter eight sets out the main conclusions of the thesis; it reiterates the contribution to knowledge, provides an internal critique, makes recommendations for policy and practice, and suggests future directions for research.

CHAPTER TWO: CONCEPTUALISATION OF AGRI-FOOD SYSTEMS AND REGULATORY GOVERNANCE

2.1 Introduction

The main purpose of this chapter is to define and review key terms, concepts, approaches, and existing theories to develop an analytical framework to achieve the research objectives in chapter one. After this introductory section, the remaining part of the chapter is divided into five sections. Section 2.2 defines and explains the concept of a sustainable agri-food system. The section reflects on how the conceptualisation of agri-food systems has evolved from a neoclassical economic perspective to the adoption of a sustainability approach. Section 2.3 explores the opportunities and challenges of the transition of agri-food systems from traditional to industrialised and globalised systems. Section 2.4 provides the definitions and approaches of regulations and regulatory governance. Section 2.5 develops a critical analysis of the relationship between expertise, policymakers, and the public in regulatory decision-making in a democratic environment. The section explores the various approaches to representation and institutionalisation of expertise in regulatory regimes, including their merits and criticisms.

2.2 Definition and Conceptualisation of Sustainable Agri-food Systems

The starting point to understanding sustainable agri-food systems is to define and break down the term ‘agri-food’ into its constituent parts and analyse their interactions with other agents within the broader socio-political and economic environment. In basic terms, agri-food refers to food products derived from agricultural sources – crop cultivation or livestock farming. By extension, an agri-food system is an interconnected web of activities, resources and people involved in the production, processing, distribution, consumption, and disposal of food products that originate from agriculture (Nguyen, 2018).

There are two main approaches to the conceptualisation of agri-food systems (Monasterolo et al., 2016; Busch, 2007; Busch & Bain, 2004). The first is the neoclassical economic approach which treats the agri-food sector as an economic system in which all activities – production, distribution, consumption, and pricing – are driven by the forces of demand and supply (Busch, 2007; Martínez-Alier et al., 1998; Emel & Peet, 1989; Pearce 1987). This approach measures mainly the economic costs and benefits of activities in the sector; in so doing, only the direct and indirect costs and benefits that can be expressed in monetary terms are considered (Martínez-Alier et al., 1998; Cocklin, 1995). It also rejects the concept of 'limits to growth'[3] by assuming that market forces and technological advancement present opportunities and possibilities to tap new resources and create substitution of production factors (Pearce, 1987).

In recent decades, there has been a global backlash against the neoclassical conceptualisation of agri-food systems as environmental issues increasingly gained international attention (Flores & Sarandon, 2004; Legg & Viatte, 2001; Jacobs, 1994; Dale, 1991; Pearce, 1987). The neoclassical approach has been particularly criticised for not representing the dynamics and complexity of agri-food systems characterised by non-linearity and causal feedback (Legg & Viatte, 2001). It is also criticised for underestimating the ecological and social impacts of agri-food activities (Wakernagel & Rees, 1998; Martínez-Alier et al., 1998).

The concept of sustainability emerged in the late 1980s (*see* Brundtland Report, 1987) as an alternative to the neoclassical approach. The sustainability approach depicts the agri-food system as a complex social-ecological system involving multiple interactions between human and natural components (UNEP, 2016; Connolly-Boutin & Smit, 2016; FAO, 2014; Ingram, 2011). Thus, sustainable agri-food systems go beyond just the production, processing, distribution, and consumption of food products to include a causal feedback loop (Connolly-Boutin & Smit, 2016; Klerkx et al., 2012). Also, unlike the neoclassical economic approach –

[3] Limits to growth is a popular 20th century term which highlights the limits of the ecosystem to absorb wastes and replenish raw materials to sustain the economy.

which focuses mainly on economic variables – the sustainability approach emphasises on the integration or the balance of economic, social, and environmental costs and benefits of all activities in the sector. The economic dimension demands that all activities along the value chain be commercially or fiscally viable. This is to say, activities within the system should be able to create employment and generate income or economic value-added for the various actors and stakeholders: wages for workers, taxes for governments and profits for enterprises (Peano et al., 2015; Macharia et al., 2013; Thompson et al., 2007; Pimbert et al., 2001). The social dimension requires the sector to contribute to advancing critical socio-cultural outcomes, such as nutrition, health, and animal welfare (Green et al., 2020; Gillespie & van den Bold, 2017; Darnhofer, 2014; Marsden, 2012; Pimbert et al., 2001). And finally, the environmental aspect demands that the impacts of agri-food activities on the immediate and the global environment are neutral or positive (Green et al., 2020; Peano et al., 2015; Thompson et al., 2007; Story et al., 2009). Incorporating all three dimensions, Story et al. (2009) define a sustainable agri-food system as one that:

> *'…provides healthy food to meet current food needs while maintaining healthy ecosystems that can also provide food for generations to come, with minimal negative impact to the environment; encourages local production and distribution infrastructures; makes nutritious food available, accessible, and affordable to all; is humane and just, protecting farmers and other workers, consumers, and communities'* (2009: 223).

The justification and the appeal to incorporate sustainability principles into agri-food systems have gained accelerating momentum globally in recent decades. First, activities and outcomes in the sector have been cited by several reports as one of the primary drivers of global environmental change, engendering feedback loops and cross-scale impacts (Goucher et al., 2017; Dudley & Alexander, 2017; Peano et al., 2015; FAO, 2014; Moss, 2008; Foley et al., 2005). According to the IPCC Fifth Assessment Report (AR5), the agricultural sector is the most significant contributor of non-carbon dioxide (non-CO_2) greenhouse gases (GHGs), such

as methane, contributing about 10–12% of all man-made GHG emissions in 2010. The agri-food sector is also the most significant driver of biodiversity loss – through the conversion of natural ecosystems, particularly tropical forests, into farmlands (Dudley & Alexander, 2017; FAO, 2014; Foley et al., 2005), and release of pollutants across the value chain (Pretty, 2008; 2005; Pretty et al., 2005).

Issues of food security, quality and safety also continue to dominate news headlines. For instance, the FAO (2021) estimated that in 2020 about 2.4 billion people worldwide lacked year-round access to adequate food, and more than 3 billion people could not afford a healthy diet. Moreover, the ongoing global environmental and socio-economic changes are impacting agri-food activities through their feedback loops. Climate-related impacts are already reducing crop yields in some parts of the world. The IPCC (2014) projections show that the adaptive capacity for farmers in regions closer to the equator will be exceeded if temperatures rise by 3°C or more.

Given the complexity of agri-food systems (comprising multiple subsystems), the overall performance of the sector – measured in sustainability terms – is intrinsically dependent on the intertwined activities of all stakeholders or actors in the system (Horton, 2017; 2016; Darnhofer et al., 2012, Thompson & Scoones, 2009). This is to say, farmers, firms, distributors, consumers, and all actors along the value chain have the power to influence sustainability performance. Since all actors are interdependent, the action of one actor can generate positive and negative feedback that influences other actors and the entire system. The systemic nature of these interactions calls for a systems approach, integrated thinking, and holistic solutions to address sustainability challenges in the sector (Horton, 2017; 2016). Adopting a holistic approach will reveal potential synergies and trade-offs to ensure that the net impact of a proposed solution on the overall system is positive.

2.3 Modern Agri-food Systems and Sustainability: Opportunities and Challenges

Principally, science and technology have been at the forefront of addressing global food security and nutritional poverty challenges after World War II. In the 1950s and 1960s, there were grave concerns about the coping capacities of countries to feed the world population, which was growing exponentially. For instance, Paddock and Paddock (1967) forecasted a worldwide famine by 1975. However, the widespread adoption of agri-technologies – including the development of synthetic fertiliser inputs, the discovery of powerful pesticides and high-yielding varieties of crops led to major increases in food production. Between 1966 and 1990, while the population of the densely populated low-income countries grew by 80%, food production more than doubled in the same period (Evenson & Gollin, 2003). At the same time, the improvement in agri-food supply chains and integration of global markets, through the facilitation of better storage, transportation, information, and communication technologies, made it easier for food to be transferred across continents, addressing the challenges of shortages, surpluses, and wastages (Robbinson & Carson, 2015; Oosterveer & Sonnenfeld, 2012).

Projecting into the future, agri-food technologies, such as biotechnology and nanotechnologies, have been advanced by several actors as a favourable approach to holistically address sustainability issues emerging in the sector (Frewer et al., 2011; Beddington, 2010). New genomic techniques, including assisted breeding – which allow greater selectivity and minimisation of uncertainties in plant breeding – have been used to promote a range of qualities such as submergence tolerance in rice and increased resistance to pests and diseases (Collard & Mackill, 2008). In the livestock sector, there have been significant advancements in molecular genetics and reproductive technologies referred to as ‘precision animal breeding’ to help enhance the genetic diversity of animals and improve animal welfare (Flint & Woolliams, 2008). Also, there has been substantial progress in vaccine development and quick diagnostic tests to combat animal diseases. These developments

have led to the almost complete eradication of animal diseases such as the rinderpest virus (Normile, 2008).

While the adoption of these technological innovations in the agri-food sector has received widespread commendation, there remain several criticisms. The first major opposition to technological solutions to agricultural problems (technological fix) emerged in the 1960s, after the publication of Rachael Carson's 'Silent Spring' (Carson, 2015; 1962). Initial concerns were on chemical pesticides, but in the 1970s and 1980s, it widened to include other technologies, such as synthetic fertilisers, and the consequences of agricultural intensification on farmland ecology, pollution, and landscape change (Clark & Lowe, 1992). In recent years, technologies such as genetic modification (GM) and irradiation have also provoked considerable opposition (Gaskell et al., 1999; Grove-White et al., 1997). Agricultural biotechnology, in particular, remains an area of broad contention, with general uneasiness about the possible health and wider ecological effects (Mallinson et al., 2018; Moshelion & Altman, 2015). There are general concerns about the risks and uncertainties surrounding the technology and the capacity of the scientific community and regulatory authorities to properly understand and effectively regulate it (Moshelion & Altman, 2015).

Some scholars have argued that the modern world is moving from 'industrial society' to 'risk society', characterised by an engrossed recognition of potential risks and the negative effects of scientific and technological developments without taking the positive effects into greater consideration (Chatalova et al., 2016; Beck, 1992). Public concerns over the implications of new technologies in the food chain have merged with broader debates on the sustainability of food production. For instance, in a study carried out in Australia about the perception of risk in the use of nanotechnologies, more than 80% of the respondents indicated that they were very concerned (Capon et al., 2015). In a similar study carried out by EFSA (2018) across 25 countries in the EU, 70% of the respondents indicated that they were worried about new technologies in food (including nanotechnology, cloning, and genetic manipulation), and 69% further responded that technological innovation in food can do more harm than good. Public

and consumer concerns have a strong influence on food markets and the climate in which technological developments occur.

Further, the increasing complexity in the sector fuelled by globalisation and extension of supply chains intrinsically make the sector more vulnerable to food frauds, bio-terrorist attacks, and other distant and novel risks (Distefano et al., 2018; Cheftel, 2011; Carruth, 2006). As Distefano et al. (2018: 1) put it, 'the expansion of global food markets brings benefits but also risks, such as shock transmission within the global network of trade relations'. A single contaminated food ingredient can lead to the recall and withdrawal of tons of food products in several countries, with high economic losses (Cheftel, 2011). Typical examples are bovine spongiform encephalopathy (BSE) or mad cow disease (Vos, 2000) and the horsemeat scandal which spread across the supply chains of Europe and beyond in 2013 (Schaefer et al., 2018; Premanandh, 2013). Additionally, the integration of markets and supply chains can accelerate the spread of dangerous pathogens, including antimicrobial-resistant (AMR) genes, across continents (Hughes et al., 2021; Gizaw, 2019).

2.4 Agri-food Regulations and Regulatory Governance

The growing consumer safety concerns, animal health, and environmental issues linked with modern agri-food practices have brought renewed attention to the topic of agri-food regulations and regulatory governance (Vos, 2000). Governments across the world have promulgated a series of regulations to influence activities in the sector. Additionally, regulatory institutions have been set up across multiple tiers of government to make decisions, set standards and enforce regulations (Carruth, 2006). This section explores the general definition and approaches to regulations, the regulatory instruments available to governments, and the trends and patterns of agri-food regulatory governance in the modern world.

2.4.1 Definitions and Approaches of Regulations

As a term, regulation has been defined and used in numerous ways across disciplines and among different people for a myriad of theoretical, analytical, and empirical discussions (Baldwin & Cave, 1999; Baldwin et al., 1999). The notion of regulations also remains highly contested among different stakeholders and ideological groups (Levi-Faur, 2011). To those politically on the right, regulations are just a body of rules that stifle and constrain human liberty and innovation. To those on the left, regulations are just part of the institutional superstructure that is used to serve and protect the dominant class in a seemingly civilised manner. Whereas progressives see regulations 'as a public good, a tool to control profit-hungry capitalists and to govern social and ecological risks' (Levi-Faur, 2011: 3).

According to Baldwin and Cave (1999: 2), regulations can be contrived as a form of 'red light' – 'as an activity that restricts behaviour and prevent the occurrence of certain undesirable activities' – or in the form of 'green light' – to serve as enabling or facilitating factors for certain socio-economic or environmental goods. In essence, many of the rationales or justifications for regulations centre on 'market failure'.[4] This is to say, regulations are justified on the grounds that an uncontrolled market tends to ignore indirect costs (negative externalities) or may not be interested in producing goods and services that have a positive net benefit to society (public goods). In this scenario, regulations are said to act to pursue the public interest (Francis, 1993).

Aside from the public interest approach, Baldwin and Cave (1999) identified four other major approaches or justification of regulations. The first approach is 'interest group theories', which perceive regulatory development as the product of relationships between different interest groups and the state (Francis, 1993). This approach, rather than viewing regulations as imbued with public-spiritedness, as the public interest approach suggests, views them as a competition for power. The second approach, 'private interest theories', considers regulatory

[4] Market failure occurs when there is inefficient distribution of resources in a free market.

developments to be driven by the pursuit of private interests. Some scholars argued that development and changes in regulations stem mostly from 'the force of ideas' other than private interests (Harris & Milkis, 1996; Hood, 1995; Hall, 1989). The main argument of this approach is that ideas, which are taken as an intellectual conception, express how and why the government ought to control businesses and economic activities (Harris & Milkis, 1996: 26). The final approach, 'institutional theory', contends that institutional structures and arrangements, and social processes shape the development of regulations (Levy & Spiller, 1996; Horn, 1995; March & Olsen, 1984). Here, individual actors are seen as influenced by rules and organisational and social settings rather than acting as pure rational choice maximisers. Regulations, in this context, are shaped not so much by public or private interests or ideas but by institutional arrangements and rules.

2.4.2 Regulatory Strategies (Instruments)

Regulatory strategies or instruments refer to the array of techniques available to the state or governments to influence industrial, economic, or social activities. Regulatory Instruments can be classified into four groups based on the underlying modalities they use to influence behaviour changes (Gunningham & Sinclair, 2017; Morgan & Yeung, 2007).

I. **Command and Control (C&C) Strategy:** This is the exercise of influence by the state through the promulgation of legal rules and standards prohibiting certain conduct, products, or activities, underpinned by coercive and criminal sanctions (Baldwin & Cave, 1999). In other words, C&C mechanisms are the use of the 'force of law' to prohibit certain forms of conduct or to demand specific positive actions. This strategy often entails the setting of licensing and standard regimes to control the quality or safety of products and services and to ensure efficient and equitable allocation of resources (Morgan & Yeung, 2007). The main strength of C&C regulation, compared to the other instruments, is that the force of law can be used to

compel and address a specific issue with immediacy. In so doing, the public becomes assured that 'the might of the law' is practically and symbolically working in their favour (Baldwin & Cave, 1999; Daintith, 1998).

However, in recent decades, C&C regulations have been extensively criticised by scholars, industry players and politicians (Daintith, 1998). The first concern is that the relationships between 'the regulator' and 'the regulated' under C&C tend to be too close and often lead to regulatory capture – 'the pursuit of regulated enterprises' interests rather than those of the public interest at large' (Baldwin & Cave, 1999: 36; Bernstein, 1955). Bernstein (1955), in his 'general theory of the life cycle of regulatory institutions', contends that regulatory agencies typically pass through four stages: 'gestation', 'youth', 'maturity' and 'old age'. During gestation, there is a general agreement that regulations and regulatory institutions are needed. In their youthful stage, regulatory institutions adopt an aggressive stance on the sector or the activity they regulate. At maturity, there is regulatory capture – that is when agencies that regulate an industry become influenced and subordinates of the firms they are supposed to be regulating. And finally, at old age, they become protectors of the regulated industry.

The second major criticism of the C&C approach is its alleged propensity to produce unnecessary complexity, inflexible rules and over-regulation that often lead to bureaucracy, legalism and delays in the progress and innovation in a sector. Bardach and Kagan (2002), for instance, expressed concerns about the extent to which US regulators over-regulate with rules that unnecessarily apply to a wide array of actions. According to them, rule-makers often find it difficult to design precisely targeted rules and end up drafting over-inclusive ones. They also argue that, for political reasons, regulators tend to respond to specific problems with 'across-the-board' rules and solutions. C&C regulations can also often tend to lead to 'regulatory ratcheting' – that is, the tendency for rules to increase rather than decline because of infrequent revision. Problems of setting appropriate standards and the challenges of enforcement have all been cited as the major difficulties for command-and-control regulatory instruments (Ogus, 1994).

II. Economic Instruments (EIs): This is the method of regulating socio-economic behaviours using market forces. This is usually achieved through fiscal and economic instruments such as taxes, subsidies, tradable emission/property rights and changes to ensure that the market provides an efficient service to the public (Baldwin & Cave, 1999; Daintith, 1998). The most widely used forms of EIs are taxes and charges. Here, taxes and charges are imposed to correct misallocations and inefficiencies resulting from negative externalities in the market. The charges are set to be equal to the marginal damage a firm or an industry indirectly inflicts on third parties, society, or the environment (Daintith, 1998). Conversely, governments can allot economic incentives or subsidies to individuals or firms to induce them to cut down certain undesirable activities or to entice them to produce more of a public good (Braithwaite, 2011; Ayres & Braithwaite, 1992). A typical example of this instrument is the EU's Common Agricultural Policy payments – which provide financial support to farmers and other rural businesses for delivering environmental benefits.

Proponents of EIs contend that they offer numerous advantages which help address the shortcomings of the traditional 'command-and-control' regulations. First, they are said to involve a relatively low level of regulatory discretion (Gunningham & Sinclair, 2017; Morgan & Yeung, 2007). Since charges and incentives operate in a mechanical manner once the regime is set, they reduce the tendency for regulators to be in a close relationship with the firms and individuals being regulated and hence, reduce the possibility of regulatory capture (Daintith, 1998; Ogus, 1994). Secondly, the greater freedom offered by EIs serves as an incentive to firms for technological innovation and development. Here, firms have the flexibility concerning their mode of operations and the freedom to balance the costs and benefits in an efficient manner. Finally, unlike the enforcement of C&C, which is subject to considerable uncertainty in terms of apprehension, prosecution, and the level of sanctions, EIs entail the certain payment of specific sums (Baldwin & Cave, 1999).

However, EI approaches have drawbacks in their effectiveness and enforcement. First, EI regulations rely on the assumption that individuals and firms act in an economically rational

manner. However, in practice, as Braithwaite (1982) argues, most problems, such as hazards in workplaces, are a product of negligence, accidents, or some irrational behaviour. This is to say, economic instruments are likely to influence responsible parties more effectively than ill-informed individuals or firms. Subsidies, for example, can create perverse incentives by inducing firms to increase externalities to attract further subsidies. Also, the mechanical application of EIs can be problematic in addressing individual circumstances. As Baldwin and Cave (1999) explain:

> *'A move from C&C towards incentive regimes may prove popular with firms regulated (especially where subsidies are offered) but public concern may arise on the grounds that socially harmful activity is not being stigmatised or condemned and that a licence is being given for undesirable behaviour. Subsidies may be objected to as making payments from the public purse to those in offensive conduct and negative incentives or taxes may be criticised not only for their failure to designate certain acts as unacceptable but also for taking away from industry the very resources that might have been committed to measures aimed at avoiding the undesirable consequences of their actions'* (1999: 44).

III. Consensual Instruments (CIs): This spans a broad spectrum of arrangements that relies on consensus and cooperation as the means to regulate behaviours and activities. It includes techniques such as the so-called 'self-regulation' through to other forms of co-operative partnerships between the state and non-state actors (Gunningham & Sinclair, 2017; Morgan & Yeung, 2007; Baldwin & Cave, 1999). The main difference between this mode of regulation and other regulatory instruments is that the mechanism through which behaviour is influenced depends mainly on the consent of the participants, unlike the other forms where regulatory power is reserved solely for the regulator. Consensual regulatory arrangements may have legal support offered by contract law or just social consensus within the community rather than coercive legal institutions (Morgan & Yeung, 2007).

The most popular form of consensual instrument is ‘self-regulation’. This term encompasses a broad array of arrangements which may vary according to the level of state involvement, the degree of formality, the extent of exclusivity or monopoly control, and the level at which behaviour is regulated. According to Baldwin and Cave (1999: 38), ‘simple self-regulation usually involves an organisation or association (for example, a trade association) developing a system of rules that it monitors and enforces against its own members or, in some cases, a larger community’. Self-regulation becomes ‘enforced’ when it comes under supervision or subject to some form of governmental oversight. The EU Pledge – which was introduced in 2007 by leading food and beverage corporations – to restrict the advertisement and promotion of high in fat, sugar, or salt (HFSS) food products on television, internet and in schools – is an example of self-regulation model meant to address the rising childhood obesity (Landwehr & Hartmann, 2020; Galbraith-Emami & Lobstein, 2013).

Self-regulatory mechanisms have proved popular among governments and other industry players, coupled with several advantages often cited in favour of their use. It is often claimed that, in the areas where regulated activities demand a high level of expert or technical knowledge, the industry has the superior informational capacity to be more efficient and effective to self-regulate than the state (Campbell, 1998; Priest, 1997). It is also argued that firms and associations tend to have high commitments to ‘their own’ rules; have more effective complaints procedures; are very effective in detecting violations; and cost less for the state (Baldwin & Cave, 1999: 40).

Some scholars are, however, very sceptical about the use of self-regulation, and its perceived advantages. Self-regulation models are, therefore, seen by critics to give power to groups which are not accountable to the body politic nor through the conventional constitutional channels (Ogus, 2004; 1994). Also, there is a high possibility for rules written by self-regulators to be self-serving. This is in line with the regulatory capture hypothesis, especially with enforced self-regulation; there is a strong tendency for associations having the power of authorisation to restrict entry to enable incumbent members to earn supra-competitive profits.

IV. Information or Communication-Based Instruments: This strategy involves the use of simple communication-based techniques to educate and persuade organisations, community members, or those affected by an activity to act in a manner that will help achieve specific regulatory goals (Morgan & Yeung 2007; Baldwin & Cave, 1999). The underlying mechanism of this strategy is to enrich the target audience with the necessary information that will enable them to make informed choices. In other words, communication instruments work by putting indirect social pressure on individuals to see if it will lead to behavioural change. Communication instruments can take the form of mandatory or voluntary disclosure or government-backed public education goals (Morgan & Yeung, 2007).

Mandatory disclosure is a commonly used communication instrument. Here, instead of regulating the production processes, composition, quality, price, or quantity of a product allowed, firms are mandated to disclose all information, including the composition, production process, side-effects, and quality, with the goal of facilitating customers or the public to make informed purchasing or consumption decisions (Morgan & Yeung, 2007; Baldwin & Cave, 1999). Disclosure regulations usually prohibit the provision of false or misleading information and may also involve the direct supply of information to the public by a scrutinising regulator. Firms and individuals who fail to comply with these rules can attract punishment in the form of fines or 'public shaming'. For instance, in 1997, the UK's agricultural minister, under the policy of 'naming and shaming' named sixteen pork and bacon brands as guilty of not declaring the right water contents of their products (Financial Times, 1997).

Disclosure regulation is a valuable instrument for responding to market failures that arise from 'information deficits' or addressing 'externalities' by informing third parties about the possible external costs of a product or an activity. The control mechanism within mandatory disclosure operates in two directions: from consumer and supplier perspectives. From the consumer perspective, the mandatory disclosure of product information assists in making more informed decisions in relation to the acceptability and desirability of products or services. On the other side, the obligation to disclose information serves as a check or deterrent to producers against

fraud or misrepresentation. Additionally, through the forces of demand and supply, producers are expected to adjust their production processes to reflect shifts in purchasing behaviours on the side of consumers.

The main problem with disclosure regulations is the assumption that consumers always act rationally. Consumers often make mistakes; they may misinterpret the information given or may not have adequate capacity to fully research the issue at stake. Also, market research suggests that consumers often choose products according to price rather than taking into consideration the full range of relevant information provided. Moreover, the costs of processing certain information may be excessive and time-consuming for consumers. For instance, as Baldwin and Cave (1999: 49-50) point out:

> *'If information disclosure rules were employed instead of C&C regulation in relation to food safety, a visit to the supermarket would involve a very lengthy process of scrutinising labels. It might, in many circumstances, be far more efficient for consumers to rely on the expertise and protection of public regulators and inspectorates rather than depend on their own individual assessments of risks'.*

Additionally, firms have the natural tendency to suppress unfavourable information concerning their products, so there is always the danger that wrong information or unjustifiable claims may be provided (Morgan & Yeung, 2007; Baldwin & Cave, 1999). Policing the accuracy of information is, therefore, necessary, especially when it concerns safety and quality. Also, standards may have to be applied to various items; without that, information may be offered in a manner that does not help consumers. For instance, 'may cause cancer' is a phrase often used as disclosure of products that have carcinogenic risks.

2.4.3 Agri-food Regulatory Regimes

An agri-food regulatory regime, in the broadest sense, refers to the whole set of actors, institutions, norms and rules relevant to the design, implementation and enforcement of public

regulation in relation to the entire agri-food value chain (Fulponi, 2007). In essence, the regime consists of rules – expressed through legislation, regulations, standards, and policies – and institutional arrangements – comprising actors and mechanisms to coordinate the implementation and enforcement of regulations in the sector. It covers all activities from production to final consumption of agri-food products, popularly phrased as 'from farm to fork' (Winchester et al., 2012). The Organisation for Economic Cooperation and Development (Rodigo et al., 2009) posits that regulatory governance has a dual meaning: the first involves rulemaking procedures at the various levels of government; the second is the overall implementation, compliance, and enforcement of regulatory decisions.

Regional integration and globalisation have brought about a radical alteration in the regulatory systems of many countries. Regulatory decisions are increasingly influenced by bilateral agreements, global treaties, protocols, and standards from organisations such as the Food and Agriculture Organisation (FAO) and Codex Alimentarius Commission. The regulatory system is, therefore, governed by policies and institutional structures spread across different levels of government. Along the same line, horizontal allocation of authority – the inclusion of non-state actors, such as firms, environmental interest groups, and the general public – has been on the rise. Decision-making has thus become a product of simultaneous competition and collaboration between state and non-state actors at different levels of government.

2.5 Scientific Expertise, Evidence, and Agri-food Regulatory Governance

The upswing in the use of 'science and technology' in the agri-food sector have necessitated the need for expertise in the regulatory set-up as policy issues increasingly become technical (Wilsdon et al., 2015; Frewer et al., 2011; Lee, 2009; Demortain, 2008; Busch, 2007; Philips, 2002). Scientific knowledge is often called for in the assessment of potential risks of new technologies for food safety, public health, animal welfare, and environmental quality. Also, almost all emerging challenges in the sector, such as infectious livestock diseases, climate

change impacts and biodiversity loss, are technical in nature; and thus, warrant inputs from experts in the identification, formulation and framing of the regulatory problem (Handford et al., 2014; Grundmann & Stehr, 2012; Frewer et al., 2011; Lee, 2009; Marsden, 2008; Jongen & Meulenberg, 2005).

Doern and Reed (2000:5) described the regulatory environment where 'scientific knowledge and personnel constitute significant or effective inputs or are distinctive features of the relevant decision-making process' as a "science-based regulatory regime". Here, they differentiate between scientific expertise and evidence from other forms of expertise or information, such as those provided through market pricing or democratic voting systems. Science-based agri-food regulatory regimes have been embraced by governments across the globe, especially within the OECD community (Grundmann & Stehr, 2012). This section highlights the main approaches to the representation and institutionalisation of expertise and scientific knowledge in regulatory regimes.

2.5.1 Technocratic Approach

This approach is based on the presupposition that scientific facts and evidence are socially and politically neutral. It should, therefore, replace the traditional mode of governance – characterised by partiality, biases, and vested interests. As described by Bertsou and Caramani (2020) and (Esmark, 2020):

> *'Technocracy is a form of power in which decisions over the allocation of values are made by experts or technical elites based on their knowledge, independently and in the long-term interest of the whole of society'.* (Bertsou & Caramani, 2020: 3)
>
> *'The institutionalisation of technocratic rule has always been associated with the creation of governing bodies…bestowing supreme power on scientists, engineers and other experts appointed on the basis of strict meritocracy rather than popular election'.* (Esmark, 2020: 79)

This approach appealed to most governments, especially before the 1990s, because of the narrative power it had to depoliticise controversial policy issues. Weber (1978) described science as a clear example of legal-rational authority – meaning science is accorded authority in governance as a result of its social reputation of objectivity and rationality. Peter Haas (1989, 1990, 1992) introduced the concept of epistemic community to refer to knowledge-based expertise that is involved in policymaking. According to Haas (1992), because of their control over the production of knowledge and information, the epistemic community has the ability to deduce and make predictions on an issue which helps in the identification and framing of policy issues (Haas, 1992: 2). They teach policymakers and other state actors a new pattern of reasoning which assists them in overcoming collective action problems (Haas, 1992: 3).

Technocratic approaches to governance started to attract criticism from the 1960s onwards from scholars mostly based in sociology, science and technology studies, and political science. The criticisms centre on the openness, legitimacy, and accountability of the expert and advisory groups to the public. Jasanoff (1990: 1) asserted that 'scientific advisory committees occupy a curiously sheltered position in the landscape of regulatory politics' (Jasanoff, 1990: 1). She explained that in spite of the central role that scientific advisors play in regulatory policy processes, their activities and level of impact were poorly documented and difficult to evaluate. Dahl (1989: 337) also argued that 'the increase in elite "public policy specialists", puts the Western polyarchies in the position of being replaced by a "quasi-guardianship'' of autonomous experts, no longer accountable to the ordinary public'. Fundamental questions posed by these scholars focus on the role of democratic participation in increasingly expert-driven societies.

2.5.2 The Decisionist Approach

This approach emerged as a response to the perceived danger of the increasing authority, influence, and power of scientific expertise in regulatory governance under the technocratic

approach (Millstone, 2010). Proponents of the decisionist approach argue that the activities and the role of expertise should be subject and accountable to democratically elected officials (Wilson & Clark, 1991). This is to say, the deliberations, judgements and evidence produced by scientific expertise should be presented to either the executive or legislative bodies, who in turn make regulatory decisions. This approach makes a distinction between 'risk assessment' and 'risk management' (Millstone, 2010; Ball, 2007). The former is typically portrayed as a purely scientific process, while the latter is considered as a policymaking stage – where other normative factors, including socioeconomic and political factors, are considered.

The main critiques of this approach come from the perspectives of systems thinking and new institutional theories. According to critics, scientific advisory systems do not operate in isolation from broader policy but are linked to multiple actors and agents within society (Baker & Peters, 1993; Dake, 1992; Jasanoff 1990). The interaction among these actors produces new institutional layers, which in turn affect regulatory decisions. Jasanoff (1990:230) posited that '…pleas for maintaining a strict separation between science and politics continue to run like a leitmotif through the policy literature…, in practice, to restrict the advisory process to technical issues or that the subjective values of scientists are irrelevant to decision making'. Barker and Peters (1993) also argued that there are normative dimensions to the selection of expertise and also, the potential for risk managers to cherry-pick or manipulate scientific knowledge to suit specific policy goals. Hence, the constant portrayal of risk assessment procedures as completely separate from risk management, and also, the assumption that risk assessment procedure is purely value-free and objective is often illusory.

2.5.3 The Co-Dynamic Approach

The co-dynamic approach emerged from empirical works by scholars in the field of sociology of science, science and technology studies (STS), political science and policy studies (Millstone, 2010; Ball, 2007). The approach proceeds from the basis that scientific

deliberations on risk governance never operate in a policy vacuum (Strasser & Haklay, 2018; Baker & Peters, 1993; Dake, 1992; Jasanoff 1990). Advocates of this approach contend that scientific considerations alone cannot define the questions that scientific experts address; on the contrary, they are framed within a variable social context. This approach highlights the reciprocal links between science and policy (Jasanoff, 2017). First, elected policymakers – following deliberations with various stakeholders and the general public – take explicit responsibility for framing the policy agenda for expert deliberations. Scientific experts then produce the evidence – indicating what is unknown or uncertain and the benchmarks upon which the evidence was made (Millstone, 2010).

Co-production is one of the main theoretical frameworks that emerged from the co-dynamic approach. A co-productive model takes participatory approaches, ranging from consultation with the public and other stakeholders to the framing, formulation, and implementation of regulatory decisions (Harbers, 2005; Jasanoff, 2004). The core motive of co-production is to link the logic of democracy (bargaining and popular control) to knowledge development (Strasser & Haklay, 2018; Jasanoff, 2004). Thus, co-productive models attempt to establish balanced and transparent procedures for accountability so that stakeholder participation can usefully complement the role of scientific institutions. Liberatore and Funtowicz (2003) indicated that the provision of pluralistic expert advice to democratic institutions gives way to informed debate and bargaining and also increases the capacity of democratic institutions to discuss and meet citizens' expectations.

The main challenge of the co-dynamic approach is that it increases ambiguity in the framing and interpretation of policy problems. According to Cairney (2016), an increase in policy actors across the various levels of government leads to a proliferation of rules and norms and the tendency for certain beliefs or paradigms to dominate. This, in turn, affects the framing, integration and demand for scientific evidence. Moreover, science derives its authority from the public mainly by maintaining its independence from politics. The main objection to the co-

dynamic approach is that it opens up expertise to politicisation and subsequently leads to the decline of the legitimacy of scientific agencies (Fischer, 2009; Liberatore & Funtowicz, 2003).

CHAPTER THREE: THEORETICAL REVIEW

3.1 Introduction

This chapter reviews the theories and concepts and how they are combined to achieve the research objectives. After this introductory section, the remaining part of the chapter is divided into three sections. Section 3.2 reviews the theoretical concepts as regards the EU's relations, influence and impacts on member and non-member states. The section is divided into three subsections, each analysing the theoretical concepts: Europeanisation, de-Europeanisation, and the Brussels effect. Section 3.3 reviews the strands of the new institutional theory: sociological, rational choice and historical institutionalism. Finally, section 3.4 integrates all the theories to construct a framework to answer the research questions.

3.2 Europeanisation, De-Europeanisation, and the Brussels' Effect

The first step to conceptualising and developing a framework to analyse the implications of Brexit on agri-food regulatory regimes is to review existing theories and concepts that explain the EU's relation, influence, and impact on other countries. Such a review is imperative for analysing post-Brexit regulatory politics and governance in the UK for two interrelated reasons. First, the longstanding relationship and harmonisation of the UK with the EU may have had an impact on domestic regulatory structures, which will, in turn, influence future directions. Secondly, the rise of the EU as a regulatory state and the growth of its prominence in the global regulatory space (Bradford, 2020; Bradford, 2012; Drezner, 2005) remains a concern for the UK in its search for a new equilibrium in the global market

This section reviews three main theories and theoretical concepts in relation to EU (dis)integration and how it affects other countries (both member and non-member states). The first is Europeanisation (Bulmer, 2008; Featherstone and Radaelli, 2003; Borzel and Risse, 2003), which focuses on the EU's relationship and impacts on member states. The second is

de-Europeanisation (Burns et al., 2019; Armstrong, 2018) which explains the cause and effects of a deliberate reversal of Europeanisation. And lastly, the Brussels effect (Bradford, 2020; Bradford, 2012), which emphasises the EU's influence on global regulations.

3.2.1 Europeanisation

Like many other political concepts, Europeanisation has been used in a myriad of contexts within the social sciences to denote changes within European politics and international relations. The term has gained prominence over the past three decades, taking on broader meanings about mechanisms, outcomes, and indicators (Nanou et al., 2017; Moumoutzis & Zartaloudis, 2016; Exadaktylos and Radaelli, 2012). Featherstone and Radaelli (2003) identified a fourfold typology within which Europeanisation has been used and applied by contemporary scholars: historical phenomena (Kahout, 1999; Cesnys, 1991), transnational cultural diffusion (Maguire et al., 1999), institutional adaptation (Bulmer & Burch, 2001; 1998; Benoit, 1997), and adaptation of policy and policy processes. The first two categories take maximalist approaches to analyse the relation of Europe with the rest of the world, whereas the last two focus on the EU and its relation to member states. Given the aim of this research, an emphasis is placed on the last two typologies. Thus, Europeanisation is defined here as the process of institutional transformation and adaptation of the EU's policy and processes within national and subnational frameworks.

As a process of institutional adaptation, Europeanisation is often used to denote how member states' actors, institutions and agencies adapt to the obligations of EU membership (Bulmer & Burch, 2001; Benoit, 1997). As Featherstone and Radaelli (2003:3) explain, 'it is a process of structural change, variously affecting actors and institutions, ideas, and interests to reflect a phenomenon within the EU'. Rometsch and Wessels (1996) postulate further that Europeanisation entails the 'fusion' of national and EU institutions in policymaking processes, though partial convergence of polities. Restructuring and redefinition of powers and interests

across different tiers of government – as multilevel bargaining structures or as involving 'nested games' (Tsebelis 1990) – have also been captured by some studies as a key feature of Europeanisation. This process also leads to the dispersion of power and participation among actors to form policy networks involving both vertical and horizontal relations. As described by Risse et al. (2001: 3), Europeanisation includes the 'emergence and the development at the European level of distinct structures of governance..., and of policy networks specializing in the creation of authoritative European rules'.

For scholars of international relations, Europeanisation reflects the evolution of EU foreign policy coordination. For example, Tonra (2001: 229) defines Europeanisation in foreign policy as a 'transformation in the way in which national foreign policies are constructed…, and in the consequent internalisation of norms and expectations arising from a complex system of collective European policy'. Among scholars of regulatory politics and governance, a prominent feature of Europeanisation is the rise of the EU as a 'regulatory state' and the vertical and horizontal delegation of regulatory authorities to supranational agencies (Thatcher & Coen, 2008; Coen & Thatcher, 2008; Lodge, 2008; 2002; Majone, 1997; 1994). As Lodge (2008) contends:

> *'The allocation of regulatory authority has witnessed both a move towards the EU level and "sideways" to non-majoritarian institutions'* (2008: 289).
>
> *'The formalisation of relationships within the regulated policy domain suggests a reduction in the discretionary powers of the national level of government, due partly to the importance of European law within the national context…'* (2008: 282).

The public policy impacts of EU membership have also been discussed extensively in recent literature. In most studies, 'participation in EU institutions and processes is often linked to a domestic policy convergence or mimicry between member states' (Featherstone & Radaelli, 2003:11). Meny (1996: 8-9) posit that there is a 'progressive emergence of a bundle of common norms of action, the evolution of which escape the control of any particular member

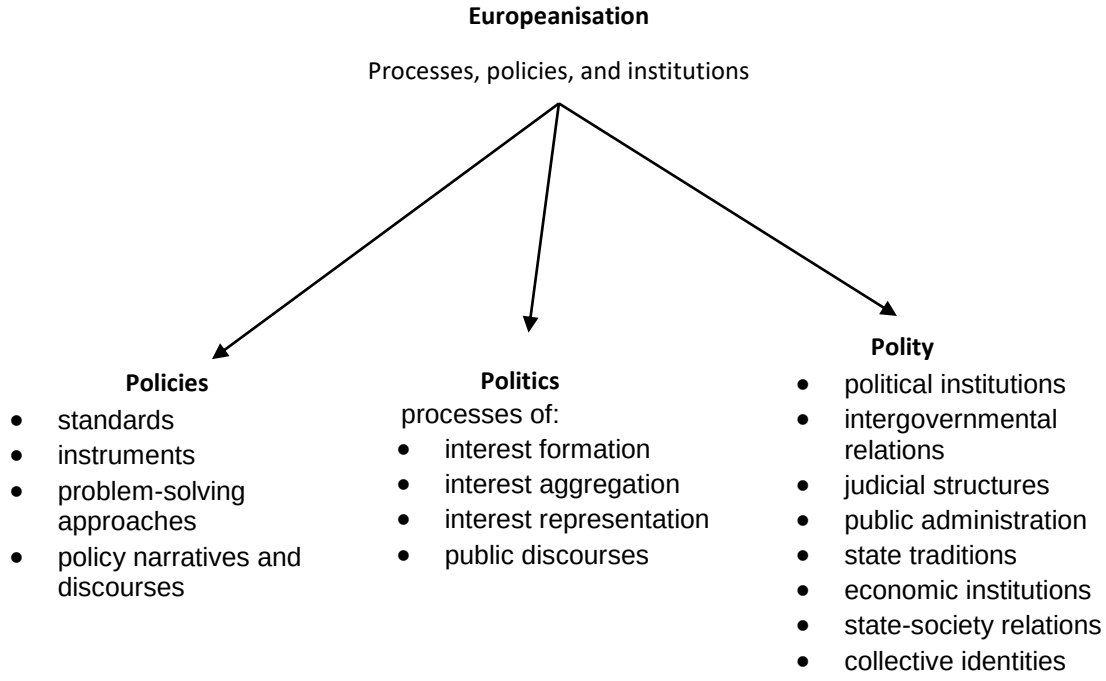
state and yet decisively influences the behaviour of public policy actors'. Some studies also emphasise the constraints EU regulations and policies pose for domestic policy goals (Rothstein et al., 1999; Lecher & Rub, 1999; Jordan, 1998; Radaelli, 1997). According to Thatcher (2004:284), the Europeanisation of regulatory regimes creates winners and losers. Actors with existing policies or strategies congruent to the EU become winners, whereas actors whose strategies are hindered by EU regulations become losers of Europeanisation.

Whereas the initial literature portrayed Europeanisation as a top-down, unidirectional process in which the EU impacted member states, it is now broadly understood that it entails a complex interactive network comprising three main policy dynamics: uploading, downloading, and cross-loading (Tonra, 2015; De Flers & Müller, 2012). Uploading involves how and the extent to which national policy goals are elevated to the EU policy-making table as a means of adding collective European weight to national preferences. Downloading occurs when EU policy positions are embedded within national policy frameworks. Cross-loading is a later addition to the classic Europeanisation literature (Czulno, 2021; Major, 2005). It is concerned with how member states learn from one another through socialisation from the network of shared information, shared facilities, and collaborations.

From an analytical perspective, Europeanisation typically seeks to explore the cause and effect of EU integration on member states. Hence, the design of the framework of analysis warrants a 'definitional clarity and conceptual parsimony' to avoid the problem of 'conceptual stretching' (Armstrong, 2010; Radaelli, 2003). As Featherstone and Radaelli (2003: 34-35) highlighted, any analysis of Europeanisation demands: 1. A precise clarification of the domains being studied – *'what is Europeanised',* and 2. The extent and direction of Europeanisation. As regards the domains, Featherstone and Radaelli (2003: 35) identified three distinct spheres: macro-domestic structures, public policy, and cognitive-normative structures. The domestic structures involve political and legal systems, including institutions and agencies and their relations. Public policy entails a course of action taken by public actors towards a particular issue (Knill & Tosun, 2012: 4). This domain involves all elements of policymaking

such as actors, resources, and policy instruments. Lastly, the cognitive and normative structures involve norms, values, discourse, narratives, and identities of individual countries. Similarly, Börzel and Risse (2003) use the distinction between policies, politics, and polity to identify three dimensions along which the processes of domestic change and impacts of Europeanisation can be analysed and traced (see figure 3.1).

Fig 3.1: The Domestic Effects of Europeanisation



Source: Borzel and Risse (2003: 4)

Risse et al. (2001: 6-12) developed a pragmatic – three-step – model to explain the process by which EU integration affects domestic change and the outcome of these changes (*see* Figure 3.2). The first step is to identify relevant Europeanisation processes at the EU level – formal and informal norms, rules, regulations, procedures, and practice – that show some measure of domestic change. The second is to identify 'goodness of fit' – that is, whether there is a 'misfit' (Duina, 1999) or 'mismatch' (Héritier et al., 1996) – between the Europeanisation processes and domestic institutional settings, rules, policies, politics, and practices. According to them, the degree of 'fit' constitutes 'adaptational pressures' – which are defined by the extent to which domestic institutions would have to change to comply with EU rules and

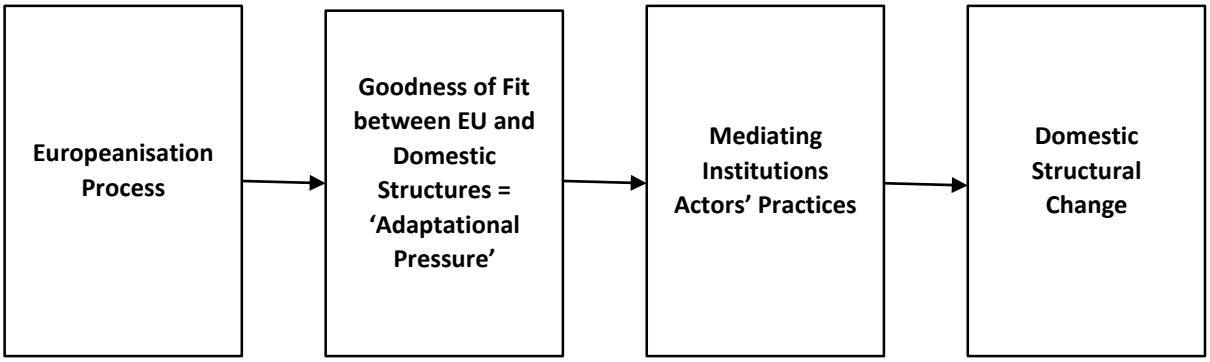
policies. ‘Strong fit’ implies ‘weak adaptational pressure’ on member states, whereas ‘weak fit’ implies ‘strong adaptational pressure’.

The third step suggests that the level of adaptation at the domestic level depends on five facilitating factors, namely: 1. Multiple veto points in the internal structure, 2. Existence of formal or facilitating institutions, 3. Political and organisational cultures. 4. The differential empowerment of norm change agents or norm entrepreneurs, and 5. Socialisation and learning mechanisms. They specify that the first three points are structural factors that might enable or block adaptational change, whereas the other two are embedded factors pertaining to agency or nation-states. First, multiple veto points are likely to inhibit structural adaptation (Tsebelis, 1995) or at least slow down to a considerable degree the adaptation to Europeanisation pressure, all things being equal. Facilitating formal institutions, on the other hand, provides actors with material and ideational resources to induce structural change. Political and organisational cultures also affect how domestic actors use adaptational pressures emanating from Europeanisation to induce structural change. They explain further that structural changes lead to a redistribution of power capacities among the relevant actors in a political, social, or economic system. For instance, the transfer of policies and authorities from the domestic to the EU arena cause executives to acquire some ‘home-turf advantages’, which in turn widens their autonomy in relation to other domestic actors. Finally, socialisation and learning constitute agency-centred mechanisms to induce transformations in actors’ interests and identities.

Bulmer and Radaelli (2004) elucidated the concept of Europeanisation pressure by relating adaptational pressure to different governance mechanisms of the EU and member states. Here, other things being equal, governance by hierarchy, characterised by strong supranational power and the use of command-and-control (C&C) instruments, generates the greatest pressure for change. However, governance is characterised by facilitated coordination; that is, in policy areas in which national governments have greater control or EU laws are not prominent, Europeanisation occurs mainly through learning and socialisation

rather than pressure. As summarised by Bache (2008a:11), 'governance by negotiation provided member states with the opportunity to upload, and governance by hierarchy and facilitated coordination were the two downloading mechanisms'.

Fig 3.2: Europeanisation and Domestic Structural Change



Source: Risse et al. (2001: 6)

The 'goodness of fit' argument and the notion of 'adaptational pressure' have been challenged by scholars in terms of their conceptual and empirical strength (Buller, 2006; Mastenbroeka & Kaeding, 2006: 331; Dyson & Goetz, 2003: 16; Featherstone & Radaelli, 2003). Featherstone and Radaelli (2003) argue that in countries where domestic institutions are fragile, the interaction between the EU and the country is dialectic, as they 'do not behave like rigid posts, capable of fencing or shaping the process of Europeanisation' (Featherstone & Radaelli, 2003: 45). They also contend that the metaphor of 'the fit' covers a broad range of elements, which makes it impossible to have any absolute compatibility or mismatch. Moreover, EU policies and frameworks do not have any absolute 'existence' but are often subjective (Buller, 2006; Dyson & Goetz, 2003: 16). Also, the notion of 'adaptational pressure' has been criticised as a weak predictor of how countries respond to Europeanisation (ibid: 46). As demonstrated by Haverland (2000), a country can be under strong adaptational pressure and still implement EU policies without problems. Featherstone and Radaelli (2003: 45-46) thus consider the presence or absence of intervening factors such as institutional capacity, the timing of European policies and policy structure and advocacy coalitions as more crucial for explaining Europeanisation rather than 'adaptational pressure' or 'goodness of fit'.

Borzel and Risse (2003: 69-70) offered a threefold typology of the outcome of Europeanisation. This approach categorises the extent of Europeanisation into three distinct degrees:

1. Absorption: This is where member states incorporate EU policies, practices or ideas into domestic programs and structures without substantial modification of existing processes or institutions. This denotes a low degree of domestic change.

2. Accommodation: Member states adapt existing policies and practices without changing their essential features. This could be done by 'patching' new policies onto existing ones without changing the latter (Héritier, 2001). The degree of domestic change under this type is modest.

3. Transformation: This process involves member states fundamentally changing existing policies, procedures, and institutions with substantially new or different ones. Here, the degree of domestic change is high.

3.2.2 De-Europeanisation

The concept of de-Europeanisation has emerged in recent EU studies literature as a reverse process of Europeanisation (Burns et al., 2019; Gänzle et al., 2019; Domaradzki, 2019; Gravey & Jordan, 2016; Gravey, 2016). The interest in this topic has risen proportionately as the demand for deceleration of EU policy expansion – from the Dutch declaration on the end of an 'ever closer union' (van Buitenlandse Zaken, 2013) to British demands for a cut in 'red-tapism' (Business Taskforce, 2013), and ultimately the Brexit vote to leave the EU. De-Europeanisation is often conceived as a 'mirror image' (Müller et al., 2021) or a 'reverse process' of Europeanisation (Gänzle et al. 2019; Domaradzki 2019; Gravey and Jordan 2016; Gravey 2016). Radaelli and Salter (2019), and Gravey and Jordan (2016) used the terms; Europeanisation in 'forward gear' and 'reverse gear' to set the relationship or distinction

between Europeanisation and de-Europeanisation. As Radaelli and Salter (*in* Gänzle et al. 2019: 36) put it:

> *'The forward gear is about the explanatory causal mechanisms that link interactions at the EU level to domestic policy change. The reverse gear (which we also refer to as de-Europeanization) is about less collective action at the EU level, and the demands or pressures for a reduction in the scope or breadth of existing EU policy...'* (2019: 36)

For conceptual and analytical clarity, scholars often distinguish between de-Europeanisation and other theories of policy change (Müller 2021; Copeland 2012). According to Müller (2021: 522), 'it is possible to identify at least three intersecting criteria that indicate a boundary between simple policy contestation….and a clear shift towards de-Europeanisation'. The first is the scope of the discursive tone of the policy issue or challenge. In a case where there is a regulatory policy shift, but the change still lies within the core or foundational norms or standards of the EU, it is regarded as a simple policy contestation rather than de-Europeanisation (ibid: 522-523). On the contrary, if a proposed policy shift violates the core norms or objectives underpinning EU policy goals, it could be said that the Member State is on the path of a different agenda and can therefore be classified as de-Europeanisation (ibid: 523).

The second criterion is the scale of the policy shift. Here, a simple political or policy contestation may be at play when the political or ideological landscape of the Member State shifts from only one or few regulatory issues. However, if the contestation is pervasive – visible across a more extensive range of policy positions in a particular regime – then it is in the direction of de-Europeanisation (ibid: 523). The third criterion relates to areas where there is a spectrum of member states' policy positions. Especially when EU policy is in the form of recommendations or opinions, member states develop their policies based on national policy positions and preferences – there is always a space for compromise and divergence. In such cases, for de-Europeanisation to be evidenced, the Member State concerned should have

consistently positioned itself either outside the range of the position of other Member States or is always at their furthest fringes (ibid: 523).

Copeland (2016) also suggests the need to distinguish between disengagement and de-Europeanization. He defines disengagement as a reduction in the intensity or a retreat from active Europeanisation while leaving the domestic structures and processes affected by Europeanisation untouched. De-Europeanisation, on the other hand, involves disengagement together with a deliberate action to reverse the domestic impacts of Europeanisation. Copeland (2016: 1126) suggests that the key feature of de-Europeanisation is that it is an 'intentional' or a 'deliberate' undertaking with 'the specific aim to reverse the process of Europeanisation and to prevent future uploading and downloading in the governance process'. In like manner, Daehnhardt (2011: 14) defines de-Europeanisation as 'a practice through which a Member State acts "intentionally" so as to prevent uploading or downloading effects from occurring in the national and European dimensions'. This conceptual distinction is relevant in the context of Brexit and the objectives of this project because as Burns et al. (2019: 273) contend, 'the act of leaving the EU clearly constitutes an intention to de-Europeanise. However, it does not follow that the UK will actively dismantle the governance processes and policies established as a consequence of EU membership'. For instance, in an event where the UK maintains most of EU agri-food regulatory standards and policies – to facilitate the new trade arrangements – there will be disengagement rather than de-Europeanisation.

The concept of dismantling has emerged in recent literature as a relevant analytical tool to explain the dynamics, mechanisms, and outcomes of de-Europeanisation (Radaelli and Salter, 2019; Burns et al., 2019; Gravey & Jordan, 2016; Steinebach & Knill, 2017). As Jordan et al. (2013) and Bauer and Knill (2012) suggest, the concept of dismantling is very open and useful to complement other policy change theories. Bauer and Knill (2012: 35) define policy dismantling as 'a change of a direct, indirect, hidden or symbolic nature that either diminishes the number of policies in a particular area, reduces the number of policy instruments used

and/or lowers their intensity'. By combining the two concepts, de-Europeanisation can be defined as the 'cutting, diminution or removal of existing [EU] policies' (Jordan et al. 2013: 795) and domestic impacts of Europeanisation.

Bauer and Knill (2012) developed an analytical framework which systematically elucidates the causes of policy dismantling, the conditions under which policy actors interact, the strategies available to them and the expected outcomes. The framework captures six key elements: actor preferences, external factors (prevailing macro conditions), institutional constraints and opportunities, situational factors, dismantling strategies, and outcomes. Actor preferences refer to the motivating factors that influence policy actors to embark on dismantling. This element can be understood by focusing on the socio-political costs and benefits of policy dismantling to the various actors and broader society. The higher the net benefit, the greater the likelihood of dismantling. External factors and prevailing macro conditions include technological change, new ideological pressures, political saliency of specific topics such as the fight against climate change, and international or supranational pressure. In the context of Brexit and de-Europeanisation, the pressure from the EU – referred to as the Brussels effect (see section 3.4) – will be crucial in shaping the socio-political cost and benefits of regulatory dismantling and de-Europeanisation. Moreover, any dismantling activity can be expected to face considerable opposition from the actors that benefit from the status quo, which in turn serves as an institutional constraint for possible dismantling and de-Europeanisation. All these factors put together affect both the choice of a dismantling strategy and the intended effects and outcomes.

After the constellation of factors (both internal and external) and the institutional capacity, policymakers may choose among or combine different strategies to realise their preferences. Bauer and Knill (2012) highlighted four main types of dismantling strategies governments use – focusing on the extent to which a dismantling decision is actively and consciously taken and the extent to which dismantling activities are hidden or revealed.

1. **Dismantling by default** (passive dismantling decision and low visibility): This is the most subtle strategy of dismantling, which occurs by way of *de facto* withdrawal or refrain from certain policy initiatives. This strategy generally presents low visibility, and it is often used when actors consider dismantling to be a highly costly activity for them. The distinction between 'non-decision' and dismantling 'by default' is that the latter is a deliberate strategy.

2. **Dismantling by arena shifting** (active dismantling decision and low visibility): This is where the organisational or procedural base of a policy in a specific area is deliberately shifted to another political arena. This could be a vertical shift, such as decentralisation or a horizontal shift through the creation of new agencies. Within this, the dismantling strategy is active but may not be obvious to the public and other actors.

3. **Dismantling by symbolic action** (passive dismantling decision and high visibility): Here, political actors deliberately declare their intentions to dismantle existing policies. However, this intention or political declaration may not correspond to respective output and thus remain only 'symbolic'. This can come about as a result of high institutional or external constraints. The other reason is that policymakers may respond to the demands of certain groups for dismantling but might not be convinced about the socio-political cost and benefits. Dismantling decisions, in this case, become highly visible but passive in action.

4. **Active Dismantling** (active dismantling decision; high visibility): This strategy exhibits high visibility with a clear and strong preference to dismantle an existing policy. The selection of this strategy occurs when policymakers become ideologically convinced that dismantling is the most appropriate option, upon political demands and consideration of all the institutional and external factors. Here, most of the institutional constraints 'are overcome by compensating powerful losers of dismantling action that would have otherwise blocked it' (Bauer and Knill 2012: 32). Moreover, as Häusermann (2010) explains, such developments can lead to the emergence of new

cleavages and advocacy coalitions which might reduce the resistance to potential dismantling activities.

To measure the extent, intensity, and expected outcomes of the available dismantling strategies, a distinction is made between policy density and policy intensity (Knill et al. 2009). Policy intensity describes the extent to which governmental activities focus or are directed towards a particular policy area, while policy density is about the penetration and internal differentiation of a given policy field, subfield, or policy item. Also, while policy density measures the breadth of legislative or regulatory activities on a specific policy issue, policy intensity measures the relative strictness of flexibility of policies. Changes in policy density can be assessed using two main empirical indicators: the number of policies and the number of policy instruments adopted. Changes in these indicators over a given period in a specific policy area explains whether an application of dismantling strategy was wide or narrow in scope.

Table 3.1 below shows the expected effects or outcomes of each of the four dismantling strategies described above. In the case of dismantling and arena shifting, fewer changes are expected to occur in policy density and intensity. A greater degree of dismantling effects can occur with arena shifting than dismantling by default. Here, it is expected that the regulatory responsibilities for various policy subareas will be transferred to other political arenas, such as new agencies or adjustments of the formal intensity. In other words, enforcement capacities, administrative capacities and the other procedural requirements of the policy will be changed to make dismantling more likely to be indirect.

In symbolic dismantling, an increase in speeches, announcements, and proposals to cut certain policies, re-adjust policy instruments and standards, or the re-labelling of institutions and agencies is expected. However, the actual implementation and enforcement of decisions will be lacking. Here, policy and instrument density are likely to increase but the likelihood for the substantive and formal intensity to change is very low. The key point here is that governments and policymakers appear to be consolidating stakeholder concerns, by setting

up working groups and review commissions, yet these recommendations may not be put into effect. However, in the case of active dismantling, an outright reduction of density – the diminution of policies or instruments – is expected. Here, there will be an evidential reduction in both substantial and formal intensity. For instance, an actual lowering of regulatory standards for a specific policy area.

Table 3.1 Dismantling strategies and their expected effects

Dismantling Type	Effects
By Default	Non-adjustment of substantial intensity
Arena Shifting	Delegation (decentralisation/agencification) of whole policy responsibilities; adjustment of formal intensity – that is with regards to enforcement capacities, administrative capacities, and procedural requirements
Symbolic Action	Announcement of a reduction in policy density or intensity; relabelling policies; commissioning consultations and evaluations of reports
Active Dismantling	Reduction in policy density; that is the abolition of policies or instruments; reduction in substantial intensity.

Source: Derived from Bauer and Knill (2012)

3.2.3 The Brussels Effect

The 'Brussels effect' has become a key concept in contemporary studies on EU external governance and global regulatory politics. Anu Bradford (2020; 2012) coined the term to depict the emergence, the role, and the factors that make the EU a global regulatory hegemon. She defines it as:

> *'…the EU's unilateral power to regulate global markets. Without the need to use international institutions or seek other nations' cooperation… the ability to promulgate regulations that shape the global business environment, leading to a notable "Europeanisation" of many important aspects of global commerce'.* (Bradford 2020: xiv)

The core feature of the Brussels effect is that it is unilateral – it does not need the cooperation of other nations, and it is noncoercive – rules or standards are not imposed coercively on non-member states. It departs from the existing scholarship on regulatory globalisation, which explains regulatory convergence as a result of cooperation or coercion. For instance, Drezner (2005) argued that consensus between great powers leads to regulatory convergence, whereas disagreements among such powers bring about regulatory divergence and the emergence of rival standards. The Brussels effect hypothesis, however, suggests that when the prevailing conditions exist, rival standards between great powers fail to materialise. Instead, the outcome of the regulatory competition is predetermined: 'the regulator with more stringent conditions prevails' (Bradford, 2020: 6), and leads to 'unilateral regulatory convergence' (ibid: 5). The Brussels effect emerges from the interplay of EU regulations, market forces, and multinational companies' self-interest to adopt relatively stringent standards globally.

The Brussels effect can be divided into two main variants: the *'de facto'* and the *'de jure'* Brussels effect. The *de facto* Brussels effect occurs when multinational companies and corporations respond voluntarily to EU standards and rules in order to penetrate into the single market. Here, no regulatory response from foreign governments is needed; corporations are just moved by their business incentives to adjust their global conduct and operations to EU rules. The *de jure* Brussels effect, on the other hand, happens when foreign governments adopt EU rules and standards and enact them into domestic rules. This type usually builds directly on the de facto Brussels effect: after multinational companies have adopted the EU standards in their production processes, they lobby their local governments to adopt EU styles

so that they will not be at disadvantage with domestic companies that do not export to the EU. De jure can also occur through political and economic treaties or through international organisations and governmental networks. It can also come about through the mobilisation of domestic actors such as consumers around EU regulations.

Earlier research on global regulatory politics emphasised market size as a proxy for a jurisdiction's ability to exercise regulatory control over foreign entities (Drezner, 2007; 2005). However, recent scholarship contends that, although a large market size is a necessary precondition for unilateral regulatory globalisation it is not a sufficient condition (Bradford, 2020; Bach & Newman, 2007). For instance, by focusing on market size alone, several countries could qualify as potential global standards' setters. However, a jurisdiction must possess sufficient institutional capacity and architecture that is able to convert its market size to a tangible regulatory influence in order to become a regulatory hegemon. This is to say, there must be institutional structures that are capable of formulating, implementing, and enforcing 'stringent' regulatory standards reflecting the preferences of key stakeholders in the jurisdiction. Bradford (2020: 25) identified five key elements that underlie the Brussels effect: market size, regulatory capacity, stringent standards, inelastic targets, and non-divisibility. According to her, the Brussels effect is more a theory of unilateral regulatory power that any jurisdiction may derive…' (ibid: 4) and 'all of these five elements are needed [to be present] for the Brussels effect to occur' (ibid: 26).

Internal market size remains a crucial factor in determining a country's regulatory power in the global political economy. As Drezner (2005: 843) sums up, 'states are differentiated by their relative power' and 'power is defined as the relative size and diversity of an actor's internal market.' It follows that *ceteris paribus*, countries with larger internal markets tend to have a stronger gravitational effect on producers from other countries, pulling them to mirror their standards to enable them to sell in their markets. In other words, a larger market size acts as 'a natural attractor for profit-seeking actors while being able to rebuff potential coercers' (Drezner, 2005: 843). Market power can, thus, shift the contours of the regulatory game in

favour of large markets. Damro (2012) concurs with this assertion, by conceptualising the EU as 'Market Power Europe' and positing that the EU's identity and alternative base of power 'is crucially linked to its experience with market integration' (2012: 683).

Regulatory capacity has also been highlighted as a key factor in determining a state's ability to project its regulatory preferences to other countries. Bach and Newman (2007: 831) define regulatory capacity as 'a jurisdiction's ability to formulate, monitor, and enforce a set of market rules'. Regulatory capacity entails regulatory expertise, resources, coherence, and the extent of statutory sanctioning authority (Bradford 2020: 31; Bach & Newman, 2007: 831). These factors collectively contribute to a jurisdiction's capacity to exert authority over market participants – both within and outside its jurisdiction. Regulatory expertise entails the ability of regulatory authorities or agencies to identify regulatory issues, formulate policy solutions, implement them, and set a competent monitoring framework. At a minimum, staff with sufficient training and relevant knowledge and experience to identify risks and areas of concern are required to develop international regulatory strategies and to make policy demands on third countries. Robust and proactive regulatory regimes also require comprehensive budgets for research, innovation, and development; state-of-the-art scientific facilities, expertise with years of experience, and a high level of professional staffing (Gilardi, 2002). Regulators with limited internal resources and inexperienced staff find it difficult to come up with international initiatives and push their agenda across foreign territories. On the contrary, those with significant internal resources – substantial experience and staffing and up-to-date facilities, are likely to have the institutional knowledge and legitimacy to influence global regulations (Demortain, 2017; Lodge, 2014; 2008; Bach & Newman, 2007).

The Brussels effect also requires jurisdictions to have a high propensity to promulgate stringent regulatory standards. Here, the Brussels effect challenges the 'race to the bottom' hypothesis – which contends that globalisation and trade liberalisation cause countries to lower their standards to improve their competitive advantage in global markets. The 'Delaware effect' had been used to explain the race to the bottom idea in the area of corporate law in the

US – where Delaware was regarded as the most attractive place to incorporate in the US because of its relaxed chartering requirements. On the contrary, the 'California effect', propounded by David Vogel (1995: 6), contends that the changes in citizens' risk perception – health, safety, and environmental risks – alter the contours of trade competition to jurisdictions with stringent conditions. The Brussels effect, thus, expands the scope and dynamics of the California effect from the US federal ++system to a global perspective. Thus, the increase in breadth and salience of public risk perception and eco-consciousness among global consumers supports 'the race to the top' hypothesis, and thereby put jurisdictions with stringent standards on a higher pedestal in global regulatory power politics.

Bradford further contends that stringent domestic rules can operate as global standards only when they target 'inelastic' products – that is products or services that are non-responsive to regulatory changes and fixed to a certain regulatory regime (Bradford, 2020: 48). The distinction between 'elastic' and 'inelastic' targets can be illustrated using consumable products such as food, and capital goods such as financial services. Capital goods are more mobile and can easily move from highly stringent regimes to less stringent regimes without necessarily affecting their target consumers. In this case, such products or services become elastic – as they become highly sensitive to regulatory changes. However, consumer markets for goods such as food are typically immobile. Here, the regulations target the location of the consumer rather than the manufacturer. Therefore, relocation of the manufacturer to a different jurisdiction will not exempt it if the target market is in the regulated area.

Moreover, given that the Brussels effect is noncoercive, it requires multinational corporations to voluntarily extend the stringent rules and requirements to their global operations. According to Bradford, companies find it easier 'to adopt a global standard whenever its production or conduct is "non-divisible" across different markets' (2020: 54). Non-divisibility means the ability to standardise – not customise – production or business activities across multiple jurisdictions with ease. Here, because of economies of scale, companies and businesses find it more beneficial to have a uniform standard to govern its global conduct rather than having multiple

sets of standards across different locations. When choosing a standard, corporations often conform to the leading standard or the more stringent (demanding) standard. The most stringent standards particularly look attractive to multinational corporations because they usually incorporate other standards as well – making it easier for them to reach larger markets with varied regulatory standards. A typical example of multinational corporations adhering to stringent standards is when US food processors refused to buy genetically modified corn or soybeans in response to the EU's strict labelling requirements (Mitchener, 2002).

One main shortcoming of the Brussels effect hypothesis is the assumption that the adaptive pressure exerted by the EU is uniform in all directions. In other words, the Brussels effect literature assumes that, in the presence of all the underlying factors, actors across all jurisdictions will respond in equal measure. This thesis, however, contends that the strength or the intensity of the Brussels effect is not the same for every jurisdiction. Actors across different jurisdictions will respond heterogeneously to the regulatory pressure exerted by the EU based on their individual socio-political and economic characteristics. For instance, a closed-economy country like North Korea is not likely to be attracted much by the EU's pressure, compared to their immediate neighbour, South Korea. Thus, the thesis contends that the strength and the intensity of regulatory force depend on the spatial relations between the EU and the given country. For example, physical distance and geographical proximity will make it more convenient for producers or corporations in Mexico to have a larger volume of trade with the US and, therefore, be more attracted to the US regulatory regime than the EU in times of regulatory divergence.

This thesis, therefore, introduces propinquity as a mediating variable that explains the intensity of the 'pull and push' effects between the EU and third countries, especially for a *de jure* Brussels effect to occur. Propinquity, here, refers to the spatial, economic, historical, or ideological proximity or closeness of one country to another. The magnitude of the Brussels effect on a non-EU member state is conceptualised to be directly proportional to the degree of propinquity or closeness of the third country to the EU. This conceptualisation makes it

suitable to apply the Brussels effect in bilateral terms – for example, to examine the possible regulatory competition between the UK and EU post-Brexit.

3.3 The New Institutional Strands of Theory

The significance of institutions in political analysis has widely been recognised, debated, and discussed in the past century. As Lowndes and Roberts posit, 'up until the 1950s, institutionalism was political science, in the sense that the discipline concentrated upon the study of constitutions and the organisational arrangements of representation and government' (2013:1). However, from the 1950s, behaviouralists – who focus on behaviours, actions, and empirical investigation to explain politics (Sanders, 2010) – rose up to challenge the classical institutional approach. For example, rational choice theorists emerged to explain political decisions in terms of the self-driven rational actions of individuals (Hindmoor, 2010). Neo-Marxist analyses that focus on how 'systemic power' – derived from capital-labour relations – shapes political behaviour and decision-making also became more popular (Maguire, 2010). The central message of the behavioural school was that political processes go beyond the formal institutional arrangements for representation, decision making and policy implementation (Lowndes & Roberts, 2013).

In the 1970s, 'new institutionalism' emerged and saw a renewal of interest and attention paid to institutions that challenged the behaviouralist assumptions that institutions are no more than an aggregation of individual preferences. Scholars across different branches and subfields of political science surfaced under the banner of new institutionalism. From historical and comparative political perspectives, scholars developed ideas and theoretical explanations of how institutions shape policy choices in areas like welfare and taxation (Rothstein & Steinmo, 2016; 2002; Steinmo & Tolbert, 1998). Rational choice scholars also highlighted the role of institutional factors in (re)structuring individuals' choices (Weingast, 2002; 1995; Ostrom, 2008; 1986). Neo-Marxists developed 'regulation' and 'regime' theories to analyse the

institutional variation in policymaking and implementation (Painter, 1996; Stoker, 1995). The core argument of the 'new institutionalists' is that 'the organisation of political life makes a difference' (March & Olsen, 1984: 747).

Contrary to the classical or 'old' institutionalism, the new institutionalists devised a more expansive definition of institutions to include informal institutional factors such as social norms and conventions. New institutionalism asserts that, above all else, institutions are integral to governance processes 'because they shape political strategies and exert an independent or intervening influence on political outcomes' (Thelen & Steinmo, 1992: 7). Institutions in this context are deemed to be a critical variable in the policymaking process by structuring the input of social, economic, and political forces, which in turn influence policy decisions (Bulmer, 1998: 369). Lowndes et al. (2018) identified five core features of new institutionalism compared to the old institutionalism:

1. New institutionalism departs from the 'brass name-plate' definition of institutions (Miller, 1995: 92) by regarding institutions as rules, not organisations. In this regard, political institutions are not the same as governmental organisations. New institutionalists embrace institutional differentiation, for instance, the increasing role of the private sector, non-governmental organisations (NGOs), and networks in governance processes.

2. They focus on both informal conventions as well as formal rules. The informal conventions and norms can shape actors' behaviour similarly to formal procedures. They sometimes reinforce formal rules (Lowndes et al. 2018).

3. New institutionalism describes institutions as dynamic but stabilising or recurring patterns of behaviour. As March and Olsen (1989: 134) state, "institutions are best seen as creating and sustaining islands of imperfect and temporary organisation in potentially inchoate political worlds'. The impulse of institutional design is crucial to

political practices as actors seek to interrelate with others on given values and priorities (Maguire, 2010).

4. Institutions embody societal values and power. In normative terms, neutral procedures and arrangements represent particular values, interests, and identities in society. (March & Olsen, 1989: 17). Political institutions are regarded as distributing power as they specify who has access to resources and decision-making authority.

5. New institutionalism describes institutions as contextually embedded. Thus, institutions do not exist as independent entities but on the contrary, connect with other arrays of institutions, which may either reinforce or undermine the effects of one another (Mahoney & Thelen, 2010: 22; Lowndes & Roberts, 2013: 42). In other words, political institutions are products of political actions and the outcomes of political struggles (Lowndes et al., 2018; Lowndes & Roberts, 2013).

Numerous scholarly approaches have been described as part of new institutionalism (Lowndes & Roberts, 2013; Hall, 2009; Peters, 2005; Scott, 2001; 1995). However, the three main strands are: sociological, historical, and rational choice institutionalism (Peters, 2019; Lowndes et al., 2018).

I. Sociological Institutionalism

Sociological Institutionalism (SI) emerged in the 1970s out of the works of sociologists looking at the influence of 'old institutionalism' in organisation theory. Fundamentally, sociological institutionalists define institutions more broadly than traditional political scientists to include cultural conventions, cognitive frames, symbol systems, ideas and moral templates that provide the 'frames of meaning' guiding human action. Such definitions break down the traditional dichotomy between 'institutions' and 'culture'. SI is more concerned about the way in which institutions create meaning for individuals (Lowndes, 2010). As described by Jepperson and Meyer:

> *'It [SI] treats the "actorhood" of modern individuals and organizations as itself constructed out of cultural materials – and treats contemporary institutional systems as working principally by creating and legitimating agentic actors with appropriate perspectives, motives, and agendas'* (2021: 9).

Premfors (2004: 16) suggests that SI is based on three interrelated ideas. First, human action depends strongly on the social context in which it takes place. Hence agency is more context-driven than goal-driven and mainly influenced by cultural logic – that is, the 'logic of appropriateness'. Second, 'such contexts are often heavily institutionalised' – that is, institutions are not only influential within their immediate sphere, or 'field', as sociologists tend to term this, but spread their interconnections and make their impacts felt across society. Finally, institutions also operate at a sub-conscious level, providing a sort of taken-for-granted 'cultural infrastructure'. Here, institutionalisation is seen as an ongoing process involving adaptation to changes in the external environment (Peters & Hogwood, 1991). When actors themselves initiate change, it is often about the borrowing, sharing, and remembering of ideas, producing outcomes that are 'recombinant' (Crouch, 2005) rather than transformational.

II. Rational Choice Institutionalism (RCI)

Rational choice institutionalism (RCI), on the other hand, defines institutions based on 'the rules of the game in society' (North, 1990). This approach draws heavily on analytical tools from rational theory and the neoclassical economic concepts of 'self-interest actors', 'utility maximisation' and 'invisible hand'. Thus, rational choice institutionalists assume that actors calculate the best course of action to maximise their interests within a specific institutional framework (Ostrom, 1986). The key theoretical focus of RCI is on the creation of institutions, the analysis of individuals' choices and behaviours, collective problems, and the outcome of the strategic actions within the institution. Rational choice institutionalists contend that institutions are created to reduce the transaction costs of collective activities among self-

interest actors. They continue to exist after their creation because they reduce uncertainty and maximise total gains.

To put it in the context of the agri-food sector, RCI assumes the actors or stakeholders in the sector – including policymakers, bureaucrats, industry, farmers' groups, and non-governmental organisations – have their individual interests and fixed set of preferences. To maximise these interests and preferences, the individual actors behave strategically and rationally by using systematic foresight and cost-benefit calculations (Beichelt, 2007). The institutional environment provides information and enforcement mechanisms that reduce uncertainty for each actor about the corresponding behaviour of others. Institutions lay down the 'rules of the game', and define the range of available strategies and the sequence of alternatives. The actors' behaviour will be highly influenced by the expectation of how other players will bargain. The institutional environment provides information and enforcement mechanism that reduce uncertainty for each actor about the corresponding behaviour of others.

III. Historical Institutionalism (HI)

Straddling sociological and rational choice institutionalism is historical institutionalism (HI) which defines institutions using formal and informal procedures, norms, and conventions (Peters et al., 2005; Hall, 1989). HI tends to focus on the history (longer temporal horizons) of institutions to explain the 'why', 'how' and 'when' specific cases began. Historical institutionalists contend that the study of history matters in politics and institutional studies because timing, sequences and 'path dependence' are essential variables that shape the socio-political and economic behaviours of actors. The main argument is that political events happen within a historical context, which directly affects the present and future decisions or events. Also, individual attitudes, behaviour, and strategic choices (highlighted by rational choice institutionalists) occur in specific social-political, economic, and cultural contexts. As

Pierson (2000: 252) put it, ‘we cannot understand the significance of a particular social variable without understanding "how it got there" – the path it took’. Thus, understanding the historical moment where an issue occurs and the action and behaviour of actors at the time offer more accurate explanations of the phenomenon than treating the variables outside the temporal dimension. HI is more concerned with politics on a grand geographical scale and on the long-term development of institutions; thus, it emphasises the spatiotemporal effects of institution building and institutional change.

The concepts of ‘path dependence’ and ‘critical juncture’ are crucial to HI analyses. Pierson (2000: 252) defines path dependence as ‘the causal relevance of preceding stages in a temporal sequence’. The path dependence hypothesis suggests that ‘what happened at an earlier point in time will affect the possible outcomes of a sequence of events occurring at a later point in time’ (Sewell, 1996: 262-3). This is to say, path dependence can cause institutions to have considerable stability, and be ‘locked-in’ even in times of suboptimal performance. As Margaret Levi (1997: 28) explains, ‘path dependence has to mean… that once a country or region has started down a track, the reversal costs are very high. There will be other choice points, but the entrenchments of certain institutional arrangements obstruct an easy reversal of the initial choice’. Pierson (2000: 254) and Arthur (1994: 112) used an economic concept of ‘increasing returns’ to explain why path dependence and institutional lock-in occur. The first argument is that actors will likely stick to existing institutions because of large set-up or fixed costs. When set-up or fixed costs are high, individuals and organisations have a strong incentive to identify and stick with a single option. Secondly, knowledge gained in the operation of complex systems also leads to higher returns from continuing use. In other words, actors may stick with existing institutions because learning about new procedures and processes is costly. Also, actors are more likely to stick to existing institutions when it is too costly or complex to coordinate multiple actors to create new institutions (coordination effects). This occurs when a specific policy regime embodies positive network externalities; it will become more attractive as more people use it. Lastly, as actors

expend resources on an institution (after considering the drawbacks of all other options), the chosen institution becomes dominant, and projections about the future make actors stick to it in a way that will make them realise their expectations.

A key analytical concept used by HI scholars is the critical juncture - a term used to capture those moments when institutional paths become established (the beginning of lock-ins) and moments of rapid and substantial change in the institutional path (Peters et al., 2005; Thelen & Steinmo, 1992). Capoccia (2015:2) describes critical juncture as 'a part of path dependence arguments, according to which institutional arrangements put in place at a certain point in time become entrenched because of their ability to shape the incentives, worldviews, and resources of the actors and groups affected by the institution'. As Hogan (2006: 661) contends, 'a critical juncture points to the importance of the past to explain the present and highlights the need for a broad historical vantage point'. According to Pierson (1993: 602), it 'suggests the importance of focusing on the formative moments for institutions and organisations'. Most HI literature on critical junctures suggests that they are characterised by the adoption of a specific institutional arrangement against alternative options (Mahoney, 2000: 512); and once that specific option is chosen it steadily becomes difficult to revert to the starting point (Levi, 1997). Thus, critical junctures establish pathways that funnel units in particular directions. However, as Hacker (2002) argues, it is important to maintain conceptual separation between path dependence and critical junctures, in order to avoid the challenge of conceptual stretching (Sartori, 1970). For instance, Pierson (2000) contends that institutional stability can result from non-path-dependent causes, meaning the definition and description of a critical juncture should not assume that they necessarily initiate a path-dependent process.

3.4 Combining New Institutionalism, (de)Europeanisation, and the Brussels Effect

Generally, as Bache (2008b: 12) posits, 'new institutionalism is a broad church that seeks to explain an array of political phenomena' and can be blended perfectly with other political

theories and concepts to explain specific organisational or policy change or institutional building processes. In the context of Brexit, combining new institutionalism with (de)Europeanisation and the Brussels effect will help assess the past, current and future relationships between the UK and the EU. First, as Bache (2008b) and Featherstone and Radaelli (2003) contend, most literature on Europeanisation are institutionalists by nature since they attempt to understand the process of institution-building at the EU level, and the associated impacts on member countries (Borzel & Risse, 2003; Radaelli, 2003; Knill, 2001; Risse et al., 2001). Caporaso et al. (2001) refer to Europeanisation as political institutionalisation, which involves the development of formal and informal rules, procedures, norms, and practices governing politics within the EU. Both the formal and informal institutions define and coordinate interactions among agents across the various levels of government within the EU (Peters & Pierre, 2004: 79). Thus, as Bulmer (2007: 51) argues, 'an awareness of the new institutionalism is indispensable for understanding how Europeanisation is theorised'.

Drawing on Risse et al. (2001) and Borzel & Risse's (2003) models, policy and institutional 'misfit' between the EU and member states' scenarios is the starting point in analysing domestic change. Thus, the lower the compatibility between European and domestic processes, policies, and institutions, the higher the need for adaptational pressure. However, as argued by recent scholars, misfit is not a sufficient condition to instigate change on its own. Therefore, complementing this model with the new institutional theory brings in parallel mechanisms and different factors facilitating domestic adaptation in response to Europeanisation. The 'logic of consequentiality', which emphasises rational goal-driven action (from an RCI perspective); and the 'logic of appropriateness' (from an SI perspective), which emphasises complex social learning process, provide useful analytical frameworks that may be helpful for explaining the adaptational processes of regulatory policy change in the agri-food sector.

Also, the application of new institutionalists' idea of stability and change help to properly frame and connect Europeanisation to de-Europeanisation. First, the concepts of 'critical juncture' and 'path dependence' provide an explanatory framework to analyse the past, present, and future relationships between the EU and the UK's regulatory framework. Path dependence helps explain the intervening effects of EU and domestic institutions on actor preferences and interests over the long term to establish distinct paths of development in policies and institutions (Bulmer & Burch, 1998). Also, the conceptualisation of Brexit as a critical juncture offers a practical analytical framework to look at the process of institutional change and the role of antecedent factors in building new institutions for agri-food governance.

Further, the conceptualisation of the 'Brussels effect' (Bradford, 2020) assumes a uniform effect across countries and regimes. However, several empirical studies suggest that organisations are not uniformly affected by external stimuli; instead, there exist numerous mediating variables that shape (either mitigate or augment) external effects. Ultimately, these intervening factors determine the extent of the Brussels effect on third countries. Therefore, bringing institutional analysis into the Brussels effect hypothesis helps to identify and distinguish between internal institutional constraints and external impacts. This approach will also enable the researcher to decipher the cause-and-effect relationship between the Brussels effect and domestic institutional change. That is, to determine the Brussels effect as a result of new constraints or opportunities or the Brussels effect as a consequence of broader socialisation and collective learning. Finally, institutional analysis can be used to connect all the other theoretical concepts used in this study – (de)Europeanisation and Brussels - together. By utilising HI analyses, the study is able to build on the historical institutional path created by Europeanisation as either a facilitating variable or constraining factor to the Brussels effect or for possible de-Europeanisation.

CHAPTER FOUR: RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

The main purpose of this chapter is to consider the research design of this thesis. The chapter is arranged into seven main sections looking at the various aspects of the research design and methodology. Section 4.2 begins with the definition of the research design and the approach chosen by this project. Section 4.3 explores the research philosophy and why critical realism befits this study. In Section 4.4, the case study methodology, the criteria, and the justification of food safety, animal health and welfare, and plant protection products regulatory regimes as case studies is elaborated on. Sections 4.5 and 4.6 provide data collection procedures and strategies adopted in the data analysis. Finally, section 4.7 provides the conceptual and analytical framework – which combines the theories, concepts and methodologies used in the studies as one framework to answer the research questions.

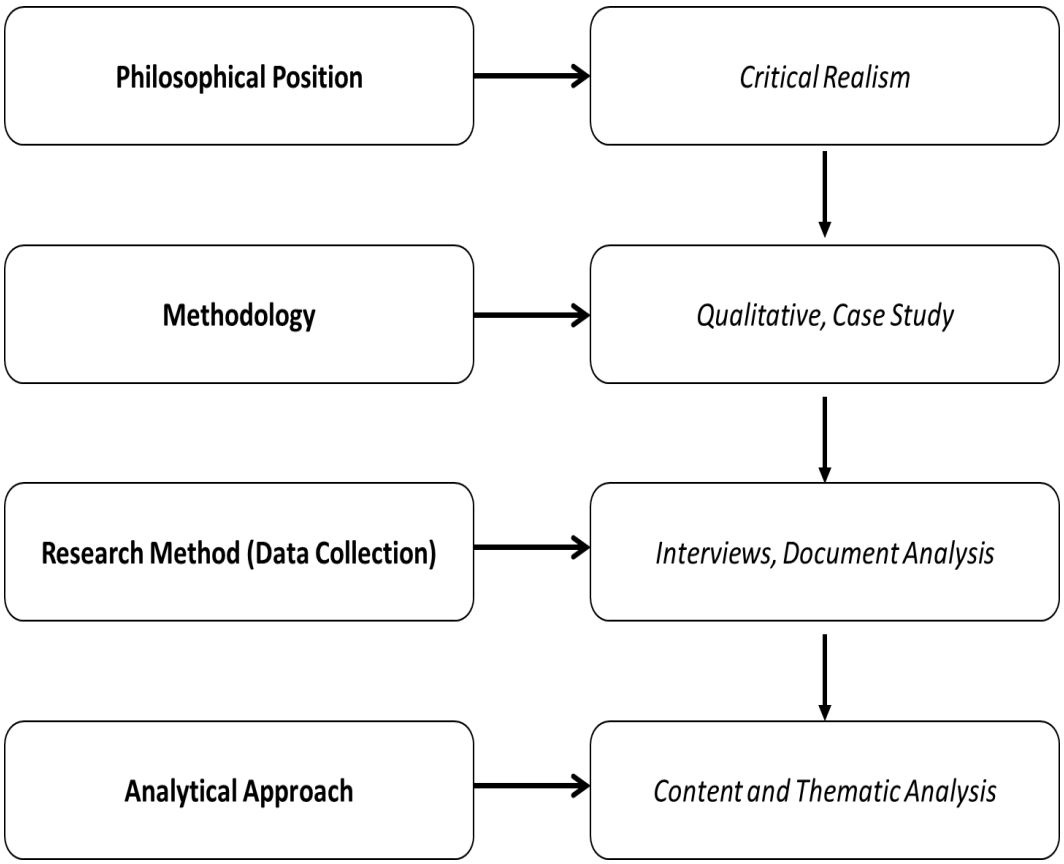
4.2 Research Design

Research design can be considered as the ‘blueprint’ of a research project that outlines and connects the various elements of the research together. It includes all the plan, structure, and strategy in answering the research questions and providing credible results. McMillan and Schumacher (2001:166) define it as ‘a plan for selecting subjects, research sites, and data collection procedures to answer the research question(s)’. Toshkov (in Lowndes et al. 2017: 219) also contends that ‘research design is about getting valid answers to research in a reliable and efficient manner’. He considers it an applied epistemology since it deals with the overarching question of "how do we know” or “how do we answer" the research questions. It is more about maximising the validity and making optimal choices under constraints. For Durrheim (2004:29), a research design is a strategic framework for action that serves as a

bridge between research questions and the execution, or implementation of the research strategy.

Research design choices can be made and represented at four levels of generality (Lowndes et al., 2017). The first and the most general level includes the adoption of general philosophical (ontological and epistemological) positions and the selection of a broad theoretical outlook. At the second and more operational level of the research design, is the conceptualisation and operationalisation of the research concepts, and the selection of research methodology. The third level concerns more concrete and specific issues, including the selection of cases to analyse, variables to measure and observe, and evidence to collect. The final level involves the actual analysis of the data collected, including the selection and design of the analytical framework. The subsequent sections in this chapter expound on the various approaches adopted under each level of the research design (see Figure 4.1)

Fig 4.1: Research Design



Source: Developed by the Author

4.3 Research Philosophy

Two philosophical paradigms have dominated social science research for most of the 20th century: positivism and constructivism. Positivism, also known as empiricism, emphasises that knowledge should be gained through observable and measurable facts (Comte, 2015; 1975; Crook & Garratt, 2005). Proponents of this approach contend that there is no essential difference between natural and social science methods (Comte, 2015; 1975; Bryant, 1985). Thus, rigorous scientific inquiry and positivist methods are the best tools to understand human behaviour instead of subjective experiences. Constructivism, or interpretivism, on the other hand, contends that reality is socially constructed, and its fundamental nature is subject to change by human agency (Durkheim, 1984; Weber, 1954; Mauss, 1954). Therefore, any effort to generalise beyond a given historical epoch or spatial context will be an illusion to social theorists.

Critical realism (CR) emerged in the 1980s out of the positivist-constructivists 'paradigm war' (Denzin & Lincoln, 2011). CR combines elements from both approaches to provide detailed accounts or to investigate a particular phenomenon. It concentrates mainly on the nature of causation, agency, structure, and relations and the implicit or explicit ontologies in which specific research operates. From an ontological perspective, CR postulates reality as stratified into three levels (Bhaskar, 1997). The first and most superficial is the empirical level, which relates to the realm of events as we experience or observe them. This is the transitive level of reality where social ideas, meanings, decisions, and actions occur. The second level is the actual, where events occur whether we experience or interpret them. Bhaskar (1997) explains that the actual occurrence regulates the observations and the experience we measure at the empirical level. The third is the real level of reality, where causal structures and mechanisms exist. He contends that social structures, unlike the natural world, are activity-dependent – influenced by the actions of one another. The primary goal of CR is, thus, to explain social phenomena through these causal structures and mechanisms along with all the levels of reality.

Following the trajectory of a qualitative research approach, CR is relevant to achieving the research objectives of this study on two main grounds. First, it allows data to be viewed from different dimensions, which in turn, aids extensive analysis of unquantifiable features, such as institutional norms and values that shape regulatory governance and policy decisions. Secondly, given the varied nature of the research objectives, using both realist and interpretive epistemologies enhances the analytical strength of the study. Here, the study takes a realist approach to examine the formal institutional structures and from an interpretivist position, assess the role and impact of informal institutional arrangements and their implications for regulatory governance.

4.4 Research Methodology

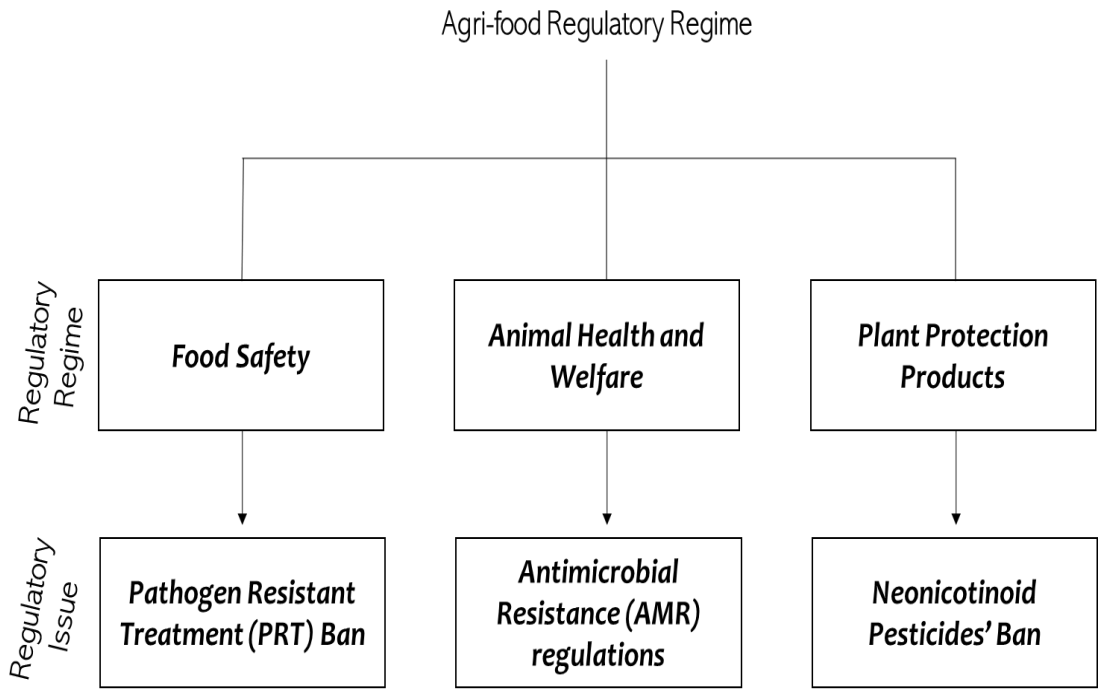
This study adopts a qualitative case study as a research methodology to explore and address the research questions and objectives systematically. Creswell defines qualitative research as an 'inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting'. Denzin and Lincoln (1998:3) also describe qualitative research as 'multi-method in focus, involving an interpretive, naturalistic approach to its subject matter'. This means a qualitative approach to research is typically used to study things in their natural settings with the purpose of describing, interpreting, and making meanings out of the studied phenomena.

As a form of qualitative research, case studies are used to generate an in-depth understanding of an organisation, phenomenon, or particular event. Creswell (2013: 97) defines case study methodology as a systematic way of exploring 'a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information…, and reports a case description and case themes'. A case study methodology can be classified as a 'single' or 'multiple' case study

based on the number of phenomena it is focusing on. A single case study focuses on one case because of its unique or exceptional qualities whereas multiple case studies look into multiple cases to make comparisons, build theory, or propose generalisations. In essence, the underlying logic for multiple case studies is to make similar predictions (literal replication) or produce contrasting results but for predictable reasons (a theoretical replication). According to Yin (2003), the researcher has the task of deciding whether a single case or multiple cases is the appropriate option to achieve the research goal. Eisenhardt (1991) explains that the number of cases chosen depends on the level of information known or the amount of new information we want to bring out.

Due to the complex nature of the agri-food regulatory system, a multiple case study with a sub-cases approach is used. As depicted in figure 4.2, three main regulatory regimes in the agri-food sector were selected: food safety, animal welfare, and plant protection. Afterwards, three regulatory issues were selected from each of the regimes: Pathogen Reduction Treatment (PRT) ban, Antimicrobial Resistance (AMR) regulations, and the neonicotinoids ban. This case study approach is particularly relevant to this research because of the multifaceted nature of the research questions. The goal is to ensure that similarities and differences across the different regimes, in terms of contestation, possibilities of convergence or divergence are covered across different cases. This will aid in making reliable generalisations about the broader regulatory regime.

Fig 4.2: Multiple Case Study Framework



Source: Developed by the Author

4.4.1 Case Selection Procedure and Justification

The case selection process began with classifying the agri-food regulatory regime into three main groups according to the EU food standards indicators: food safety and quality, animal health and welfare, and environmental quality protection and enhancement. The rationale for this classification was to ensure that the cases cover the broad spectrum of the agri-food sector – from production and preservation to consumption. Three regulatory cases were then selected under each of the regimes, based on the following inclusion criteria:

1. The regulatory decision or the policy issue must be evidence or science-based. Following the broad objective of the project, this criterion is to ensure that regulatory cases that require significant scientific knowledge or expertise in the decision-making processes are selected.

2. There is/has been a contention or an expression of concern by one or more stakeholders to reduce or tighten regulations on that issue. This inclusion criterion is to help investigate the effects of internal pressure on possible regulatory divergence or convergence with the EU.

3. Regulatory differences exist between the EU and the rest of the world on that particular issue. Global agri-food trade is increasingly shaped by regulatory standards (Swinnen, 2018; Carruth, 2006). Thus, the closer the countries or trading blocs are, in terms of regulatory standards, the less the barrier to trade between them, and vice versa. The intent of this criterion is to aid in assessing the effects of external pressure and economic interest in the design of prospective regulatory regimes.

Based on these criteria, the following policy issues or decisions were selected from the three regulatory domains:

- Pathogen Reduction Treatment (PRT) ban from the food safety regulatory regime.
- Restrictions on farm antibiotics from the animal health and welfare regulatory regime.
- Restrictions on neonicotinoid pesticides from the plant protection regulatory regime.

I. The Food Safety Regulatory Regime

The structure of national and global agri-food systems has changed rapidly since the Second World War – from the transformation of traditional farming systems and the rise of agri-food technologies to the globalisation of agri-businesses (Robinson & Carson, 2015; Carruth, 2006). The evolving structure has, in turn, led to an increase in food safety threats in global agri-food industries (Nayak & Waterson, 2019; Oosterveer & Sonnenfeld, 2012; Carruth, 2006). In the post-Second World War period, the public and consumers have increasingly become concerned about food safety risks emerging from chemical use, biotechnologies, and environmental contamination (Carruth, 2006). Furthermore, as the role of market forces

increases in national and global agri-food industries, governments have come under increasing moral, legal and political pressure to design an effective strategy to protect consumers and public health from the emerging food safety risks (Oosterveer & Sonnenfeld, 2012; Higgins & Lawrence, 2007).

The food safety regulatory regime entails all institutions, legislations, policies, individuals, and protocols deployed to protect and preserve food quality to prevent contamination and food-borne illnesses (Carruth, 2006). The EU has adopted an integrated approach to food safety governance, known as the 'farm to fork' strategy to ensure food safety from production to consumption level. The central legislation underpinning food safety strategies in the EU is the Regulation (EC) 178/2002, also known as the 'General Food Law'. Generally, food risk governance in the EU framework is divided into three main parts:

- Risk assessment entails using a scientific approach to identify and define hazards and estimate potential risks to human or animal health. This includes an evaluation of the likely exposure to risks from food and other sources.
- Risk management is the consideration of potential measures to either prevent or control the food safety risk. It considers the risk assessment and consumers' wider interests in food to formulate a response.
- Risk communication involves exchanging information and opinions throughout the risk analysis process. This may be between risk assessors, risk managers, consumers, industry, the academic community, and any other interested parties.

- **Case Studies of Pathogen Reduction Treatment (PRT) Ban**

Campylobacter and Salmonella are the largest cause of foodborne infections in humans worldwide (Radhika, 2021). These organisms are associated with poultry and poultry products. They can be found on broiler carcasses at all stages of processing (Berrang &

Bailey, 2009; Berrang & Dickens, 2000). Pathogen Reduction Treatments (PRTs) are approaches adopted to lessen the contamination and infection of these bacteria on broiler carcasses. These include physical methods, such as applying hot water, post-pick spray washers or using chemicals, such as acetic acid, chlorinated spray, or acid dip. The use of chlorine in the forms of sodium hypochlorite, calcium hypochlorite tablets, and chlorine dioxide became the most commonly used PRT in the poultry industry, especially in the USA and many other non-EU countries (Berrang et al., 2011).

In 1997, the EU began prohibiting chemical PRTs for domestic and imported poultry use. According to Article 3 of the regulation (EC) No 853/2004, 'food business operators shall not use any substance other than potable water… to remove surface contamination from products of animal origin, unless the Commission has approved the use of the substance'. The ban has stopped virtually all imports of US poultry products (where chemical PRTs are used routinely) into the EU market. The US has continually challenged the ban (through the World Trade Organisation (WTO) and the use of other retaliatory measures) for not basing the ban on scientific evidence (WTO, 2009; Johnson, 2010). Yet, the EU insists that sanitary practices during production and processing are more appropriate to pathogen control than overreliance on chemical PRTs.

This PRT ban is relevant to this project for two main reasons. First, the issue of chlorinated chicken has become more prominent in the post-Brexit trade discussion as the US has urged the UK to remove the ban (The Guardian, 2019). It is therefore of interest to see the perspectives of stakeholders and the likelihood of continued alignment with the EU or a more flexible regime to facilitate trade with the US. Secondly, this case is relevant due to the mismatch between the scientific assessment and the risk management decisions, as the EFSA produced a report in 2005 that found that the use of chemical PRTs does not present any risk to public health (EFSA, 2005).

II. The Animal Health and Welfare Regulatory Regime

Globally, the animal farming sub-sector has witnessed an increase in the use of intensive production methods such as battery cages for hens, broiler beef production, and an increase in the use of antibiotics (Naylor et al., 2018; Appleby, 2003; Fraser, 2001). The EU passed its first legislation on animal welfare, concerning the slaughter of animals, in 1974. It has subsequently extended the regulations to cover other areas such as the transport of animals, antibiotic use, and specific provisions for the farming of poultry, calves, and pigs. The EU has also adopted a single, comprehensive 'Animal Health Law ' to support the livestock sector. In the current regulatory framework, the EU Member States are responsible for the daily implementation of animal welfare strategies, whereas the Commission, through its experts, monitors the implementation and enforcement of the directives. Non-compliant Member States may be brought to the Court of Justice of the EU.

- **Case Studies on Farm Antibiotic Use**

Generally, 'antimicrobials' refer to all substances used to kill or inhibit the growth of microbes (Naylor et al., 2018). They are usually grouped according to the microbe or microorganism they act against. For example, antivirals are the type of antimicrobials used against viruses; antifungals are used for fungi treatment; and antibiotics for the treatment of bacterial infections. Antimicrobials have become an important global resource used in a wide range of sectors, including health care, industry and agriculture, to treat and prevent various types of infections. According to the World Health Organisation (WHO), the bulk of antimicrobials administered globally are used by animals and also, for food production purposes (WHO, 2017). Antimicrobial agents are used in four broad ways in the agri-food sector:

1. **Therapeutic Use or Treatment:** This is the administration of antimicrobials to an individual animal or group of animals, including livestock and poultry, who have been diagnosed with infectious disease.

2. **Metaphylactic Use or Control:** This is where antimicrobials are administered to a group of animals after an infection or disease has been diagnosed within the group with the aim of controlling or preventing the spread to other animals who are in close contact.

3. **Prophylactic Use or Prevention:** This is the administration of antimicrobial agents to animals when there is a perceived or anticipated risk of infection based on history, clinical judgement, or epidemiological knowledge.

4. **Growth Promoters:** This is where small quantities of antimicrobials are added to feeds and water to promote animal growth.

As antimicrobial agents are continually used, some microbes evolve to resist the effects of antimicrobials they were initially susceptible to (Naylor et al., 2018; O'Neill, 2016). This ability of microbes to withstand antimicrobial agents is called 'Antimicrobial Resistance (AMR)'. AMR has been ranked among experts and international organisations as one of the biggest threats to global health, food security and development (O'Neil, 2016). New resistances are increasingly emerging and spreading across global supply chains. This development threatens the ability to treat common infections such as pneumonia, tuberculosis and other foodborne diseases, as antimicrobial agents become less effective.

Over the past decades, the European Union (EU) has taken measures to minimise antimicrobial usage among member states and limit the spread of antimicrobial resistance (AMR). In 2019, the EU passed Regulation (EU) 2019/6 to ban the prophylactic (preventative) use of antibiotics in groups of animals via medicated feed and the use as a control treatment, which is due to come into effect in 2022, after the UK has left the EU. However, the prophylactic use of antibiotics is still allowed in many other major trading partners of the UK, such as the US, Australia, and Canada. Within this context, there remain questions on whether the UK will pursue the EU ban on prophylaxis or embark on a more flexible regulatory regime in the post-Brexit agri-food system.

III. The Plant Protection Products (PPP) Regulatory Regime

Plant Protection Products (PPPs) are products used mainly to protect plants and crops against harmful organisms, diseases, and infestations. They include insecticides, herbicides, fungicides, plant growth regulators and repellents (Bonanno et al., 2017). PPPs are often used as a synonym for pesticides; however, a pesticide is a broader term which includes all products used to control pests and diseases in both plants and non-plants. PPPs consist of or contain (at least one) active substance – which can be a chemical or microorganism that enables the product to perform its function. In spite of the importance of PPPs in improving agricultural production and ensuring food security, they may pose safety risks and hazards for humans, animals, and the environment (Bonanno et al., 2017). For this reason, effective regulatory regimes are needed to subject PPPs to evaluation to prove that they are safe for public health, animals and the broader ecosystem. Within the EU, a body of legislation and institutional arrangements exist to regulate the marketing and the use of PPPs and their residues in food. Regulation (EC) No 1107/2009 is the principal legislation, which provides the harmonised framework for the approval and authorisation of PPPs. Regulation (EC) No 396/2005 also set the framework for maximum pesticide residues in food and feed. Directive 2009/118, commonly referred to as the 'Sustainable Use Directive', also exists to complement the two main regulations.

- **Case Study of the restrictions on Neonicotinoids**

Neonicotinoids are a class of active substances – nicotinic acetylcholine receptors (nAChRs) – used in PPPs to control harmful insects. As the name implies, they share a similar chemical structure as nicotine – a natural neuroactive chemical commonly found in tobaccos (Casida, 2018). Following the ban of Dichlorodiphenyltrichloroethane (DDT) in most countries, scientists and agrochemical companies began to synthesise and look for potentially better pesticides based on the structure of nicotine. In 1985, Bayer – a German multinational

pharmaceutical and life science company – patented imidacloprid as the first commercially viable neonicotinoid (Elbert et al., 2008). Six other neonicotinoids – thiacloprid, thiamethoxam, acyclic nitenpyram, acetamiprid, clothianidin, and dinotefuran – were also brought to market by different companies (Elbert et al., 2008). Neonicotinoids are now the most widely used insecticide worldwide (Casida, 2018).

In 2013, the EU banned the usage of PPPs containing three neonicotinoids, clothianidin, imidacloprid, and thiamethoxam on bee-attracting crops such as oilseed rape, and sunflower, except for uses in greenhouses. In 2018, the EU completely banned these active ingredients from all fields. The decision was based on EFSA's risk assessment, which confirmed that neonicotinoid products pose high risks to bees. Meanwhile, neonicotinoids are still legal and common in most of the UK's major trading partners including the USA, Canada and Australia (Casida, 2018). Therefore, this case offers the opportunity to look at the post-Brexit regulatory politics between the UK and EU.

4.5 Data Collection Methods and Techniques

By definition, qualitative research is designed to 'investigate the quality of relationships, activities, situations, or materials' (Fraenkel & Wallen, 2003: 380). It endeavours to appreciate the world from the participants' perspectives and to explore the significance of people's experiences (Kvale, 1996). To develop such insights, qualitative research requires data which are holistic, rich, and nuanced, allowing themes and findings to emerge through careful analysis. These can either be primary data (collected from first-hand experience) or secondary data (collected from a source that has already been published). Qualitative research typically relies on three data collection methods (Kabir, 2016):

I. Observation

This entails the systematic noting and recording of events, actions, or behaviours in a particular socio-cultural, political, or economic setting. This method assumes that behaviour is

purposeful and expressive of deeper values and beliefs. Observation can range from a highly structured, detailed notation of behaviour structured by checklists to a more holistic description of events and behaviour. Observation is an important qualitative method which can be used to discover complex interactions in natural social settings. However, this method requires a great involvement of the researcher, which may lead to discomfort, ethical dilemmas and even danger.

II. **In-depth Interview:** Anderson (1990:222) defines an interview as 'a specialised form of communication between people for a specific purpose associated with some agreed subject matter'. Research interviews differ from other forms of interviews, such as Radio and Television interviews, in the sense that they focus on obtaining research-relevant information to describe, predict, or explain a particular phenomenon (Cohen et al., 2002). An in-depth interview can also take a specialised form such as:

- **Phenomenological interviewing:** This is a specific type of in-depth interviewing grounded in a philosophical tradition. It rests on the assumption that there is a structure and essence to shared experiences that can be narrated. The purpose of this type of interview is to describe the meaning of a concept or phenomenon that several individuals share.
- **Elite interviewing:** This is the type that focuses on individuals considered to be influential, prominent, or has a degree of expertise in areas relevant to particular research. Elite interviews serve as a valuable source of information because of the position or the knowledge of the elite participants in the society, industry, or subject matter. The main challenge, however, is the difficulty in gaining access to elites because of their busy schedules, and even the difficulty in getting their contact details.
- **Focus Group Interview:** A focus group is 'a group of individuals with certain characteristics who focus discussions on a given issue or topic' (Anderson, 1990: 241). Focus group interviews may be a valuable research instrument when the researcher

lacks substantial information about the subjects. Focus group provides ‘a rich and detailed set of data about perceptions, thoughts, feelings and impressions of people in their own words’ (Stewart & Shamdasani, 1990: 140). Secondly, focus groups are predominantly beneficial when a researcher intends to find out the people‘s understanding and experiences about the issue and the reasons behind their particular pattern of thinking (Kitzinger, 1995; 1994). Thirdly, this method is suitable for examining sensitive issues.

III. Document analysis: This is a systematic procedure of reviewing or analysing documents to generate empirical knowledge and understanding (Bowen, 2009). Atkinson and Coffey (1997:47) refer to documents as ‘social facts’, which are produced, shared, and used in socially organised ways. The types of documents that could be systematically evaluated include formal policy statements, archival data, minutes of meetings, announcements, newspaper articles, press releases, letters, and memoranda. As Merriam (1988:118) posits, ‘documents of all types can help the researcher uncover meaning, develop understanding, and discover insights relevant to the research problem’. Document analysis is particularly applicable to qualitative case studies – intensive studies producing rich descriptions of a single phenomenon, event, organisation, or program (Stake, 1995; Yin, 1994). Here, it is often combined with methods such as interviews or surveys as a means of triangulation – ‘the combination of methodologies in the study of the same phenomenon’ (Denzin, 1970: 291). Triangulation of data can help researchers to corroborate findings across data sets and thus reduce the impact of potential biases that can exist in a single method. As Eisner (1991:110) points out, triangulation creates ‘a confluence of evidence that breeds credibility’. Document analysis has the advantage of being less time-consuming and very cost-effective – since the data have already been gathered. It also ensures exactness, and broad coverage, and reduces the challenge of reflexivity. The main disadvantage of using document analysis, especially, as a stand-alone method is a difficulty in accessing certain documents which may

not be in the public domain. Also, incomplete access to documents may lead to 'biased selectivity' (Yin, 1994: 80), which in turn, affects the integrity and credibility of the research.

This project used both primary and secondary data collected through elite in-depth interviews and document analysis methods. These methods were suitable to achieving the research objectives. Document analysis was suitable for getting the historical account of the agri-food regulatory regimes, which have been recorded or reported in newspapers, reports, legislations, and policy documents. An in-depth interview was appropriate in getting the perspectives of stakeholders regarding the prospective regulatory regimes. The two methods were used both as standalone methods and also for triangulation.

4.5.1 Primary Data Collection Method

The primary data were collected through in-depth interviews with twenty-five experts and key stakeholders in the agri-food sector. The interviews were conducted in two stages between April 2020 and September 2021. The first session was carried out between April 2020 and April 2021, and follow-up interviews between May 2021 and September 2021. The follow-up interviews were conducted mainly to clarify and elicit stakeholders' responses on new developments that emerged from the UK-EU Trade and Cooperation Agreement (UK-EU TCA).[5] The participants were recruited from five main stakeholder groups: government departments and agencies; experts and academics; the industry, civil society organisations (CSOs) and non-governmental organisations (NGOs); and farmers' groups and associations. Participants from the experts and academic groups were mainly university professors or senior lecturers with significant experience in either of the selected cases. The respondents from the other four stakeholder groups were typically senior civil servants, senior managers, or heads of policy in a relevant department or organisation. Appendix V summarises the details of the

[5] *see* section 6.2 for details on the UK-EU TCA

interviewees – including their pseudonyms (for anonymity reasons), organisation, and stakeholder category.

The project was ethically approved on the 19th of August 2019 by the University of Sheffield Ethics Committee. Therefore, it followed the ethics procedures of the University,[6] which requires staff and research students to:

- Clearly explain the research to participants and seek their consent.
- Maintain confidentiality by not disclosing personal information without the consent of participants.
- Maintain professional standards, including honesty and integrity.
- Ensure minimal possible risk to participants.
- Respect for the values and cultures of participants.

The participants were invited via email (see appendix I) with a participant information sheet (see appendix II) and a participant consent form (see appendix III) attached. The initial research plan was to conduct face-to-face interviews. However, the fieldwork commenced just as Covid-19 pandemic was declared, and home working was mandated. Therefore, for the safety of the participants and the researcher, all the interviews were conducted online via Zoom, Google Meet or Microsoft Teams based on participants' preferences.

A total number of forty people across all five groups were invited in the first round of fieldwork to participate in the study. Out of the forty invitations, twenty-two responses were received, representing a fifty-five percent response rate. However, out of the twenty-two responses, eighteen agreed to attend the interview, whilst the remaining either sent documents or gave directions to information they perceived would be relevant to be relevant to the study or

[6] See The University of Sheffield Research Approval Procedure. https://www.sheffield.ac.uk/research-services/ethics-integrity/policy/approval

respectfully declined the interview. Seven new participants and five of the participants from the first session were recruited in the second phase of the fieldwork.

A semi-structured interview method was used to gather narrative data. According to Robson (2002), semi-structured interviews have predetermined questions, but the ordering, wording and associated questions can be added or omitted according to the interviewer's perception of what seems most appropriate. This approach allows open discussion without straying too far from the research topic and eliciting explanations (Robson, 2002; Huberman, 1994). The predefined questions in the first interview session focused on four themes:

- **Concentration of Power, Collaboration and Coordination with the EU.** Questions under this theme sought to get responses, especially from government departments and agencies, on the future relationship with scientific agencies at the EU and subnational levels. The purpose of these questions was to help explain whether there has been/will be a deliberate attempt to disentangle the UK advisory regulatory regime from the EU and whether there will be a further delegation of authority to subnational levels.

- **Institutional Capacity.** This set of questions sought to get detailed responses on the current capacity of UK advisory bodies (mainly, DEFRA and FSA), emphasising staff strength and financial capacity. Respondents from non-governmental groups and industries were also asked to get their perceptions of the current capacity of the UK's advisory and regulatory agencies. The aim was to get a broader perspective on the organisational strength, challenges, and opportunities of the UK's scientific agencies in the post-Brexit agri-food regulatory regime.

- **Credibility, Legitimacy and Trust:** This set of questions sought to investigate the measures that the scientific agencies have or intend to put in place to ensure credibility, legitimacy, and trust in the post-Brexit regime. Responses were also taken from private

and civil society groups to get their perspectives on the current advisory structures and the mechanisms for engagement and public participation.

- **Uncertainty, Contestation and Ambiguities:** The focus here was on the selected cases: Antimicrobial Resistance (AMR) regulations, Pathogen Resistance Treatment (PRT) and the Neonicotinoid ban. Stakeholders were asked these questions to help identify the ambiguities and contestation in making these regulatory decisions.

The follow-up questions concentrated on the perspectives of the stakeholders on the UK-EU TCA and other associated issues such as the UK's participation in EU's research framework programmes. The interviews lasted 40 minutes on average, with a minimum time of 25 minutes and a maximum time of 1 hour 15 minutes.

4.5.2 Secondary Data Collection Process

The secondary data for this research were collected from a variety of sources including academic journals, historical newspaper databases, national archives, parliamentary databases and official websites of departments and agencies. The process began with an iterative topic-based search on Google Scholar, Scopus, Dimensions, Lexis, ProQuest and the University of Sheffield Library resource – Starplus. The initial exploratory and scoping stage involved an academic literature review to get an idea about the key events that occur in each of the regulatory regimes studied: food safety, AHAW and pesticides.

The next stage was the historical newspaper review. The Guardian was chosen as the main historical newspaper for the study because of its in-depth coverage of science development and agri-food-related issues. To avoid ideological biases of the newspaper, the research relied mostly on direct quotes and reports without much attention to the subjective interpretation of the newspaper. The keywords and terms generated from the academic literature and the interviews were used at this stage to search through the historical newspaper database. The initial date range for the study was between 1986 and 2016. However, following the

snowballing approach, events that were cited in the search results but occurred in the past were also traced to the specified periods.

Further, the study searched for all the direct and derived EU regulations in relation to the selected cases passed in the UK since 1986. These documents were available online via the UK's Public Information Online and EUR-lex. The explanatory notes and recitals that accompanied them were also analysed to identify other relevant documents. Scientific reports and command papers cited in any of the documents were also sourced from the official websites of appropriate departments and agencies at the UK national, EU and global levels. These documents were used both as standalone data to analyse the historical trend, and development in the agri-food sector, and also to triangulate the interview responses to verify some of the claims. The research also used official statements, speeches, letters, and media interviews of key people in the stakeholder list (who could not be reached) as secondary data to complement the primary data.

4.6 Data Analysis Techniques

Qualitative data analysis entails the detailed and systematic analysis or interpretation of texts or documents with the goal of identifying patterns, themes, assumptions, and meanings (Berg & Latin, 2008; Leedy & Ormrod, 2005; Neuendorf, 2002). Thematic analysis was the main analytical tool used in this research. Braun and Clarke (2006: 79) define thematic analysis as ‘a method for identifying, analysing and reporting patterns within data’. It is particularly useful for this study because of its flexibility – the ability to adapt to different research approaches (Marks & Yardley, 2004). It also gives an opportunity to understand the potential of any case or issue more widely. Thematic analysis can take either an inductive approach (dive into the data to generate themes) or a deductive approach also known as theoretical thematic identification (that has a set of predefined themes expected to generate from the data). This project combines the two approaches in different phases of document analysis.

The data analysis began with the transcription of interviews with a combination of manual and computer-aided transcribing using 'Transcribo'. A theoretical thematic identification approach was used in the document analysis section of the study. Here, the study followed the research objectives and the relationships established in the literature to find out how "science institutions or agencies", and "expertise and evidence" play out with regulatory policy decisions across the data set. The main goal was to find both explicit and implicit meanings and patterns in the documents and how they relate to the existing theories and literature. The study also analysed the texts from the interviews to inductively pick themes under each selected case. The data were coded and analysed using NVivo 12 software. Predefined themes derived from theoretical frameworks underpinning the analysis and other themes derived inductively from the documents and the interviews were used to code the data into clusters. The second session of documentary analysis was undertaken to triangulate the responses from the interviews with available statistics and reports.

4.7 Analytical and Conceptual Framework

As discussed in chapter 3, this thesis combines the three strands of new institutional theory: historical, sociological and rational choice institutionalism, with other theoretical concepts in its analysis. As Bache (2008b: 12) contends, new institutionalism as 'a broad church' can be blended perfectly with other political theories and concepts to explain specific organisational or policy change or institutional building processes. Integrating the new institutional theory with (de)Europeanisation and the Brussels Effect aids in analysing the formal and informal institutional variables such as societal norms and values and how they affect agri-food regulatory governance in the UK over time.

In the first part of the analyses, the study conceptualises an effective advisory system as a factor of domestic regulatory capacity to produce and supply scientific evidence, and the competence to enhance the integration of evidence in regulatory policymaking. As Bach and

Newman (2007) contend, regulatory capacity is a multidimensional phenomenon. However, at minimum, it entails adequate funding for research and innovation, expertise with a significant level of experience, and the competence to coordinate and collaborate with regional and global agencies (Bach & Newman, 2007). From a historical institutionalist perspective, the analysis includes how the decades of membership with the EU have affected UK domestic institutional capacities. The analysis also includes the interaction of stakeholders – including scientists, farmers' groups, civil society groups and policymakers – in the production, and integration of scientific evidence and how the formal and informal institutional norms and practices shape the activities of the actors.

The remaining part of the analysis combines the new institutional theory with (de)Europeanisation and the Brussels Effect to develop a novel framework to analyse the relationship between the EU and the UK (a former member state). The thesis uses sociological institutionalists' "logic of appropriateness" – which stresses on the role of social learning in institution building – and the rational choice institutionalists' "logic of consequentiality" – which stresses on rational goal driven action of actors or stakeholders – to explain the process of Europeanisation and De-Europeanisation. Additionally, the historical institutionalists' concepts of 'path dependence' and 'critical juncture' is used to connect Europeanisation with de-Europeanisation by conceptualising Brexit as a critical juncture. Thus, by depicting Brexit as a moment of substantial change in the institutional path of UK's agri-food regulatory regimes, the thesis examines the dynamics of the possible future trajectories – that is, whether the UK will continue to align or diverge from EU's regulatory mechanisms. The concept of path dependence is also used to link the Brussels Effect with (de)Europeanisation by considering the role and effects of historical institutional paths in building new regulatory regimes.

Following Paul Copeland's conception that some form of Europeanisation must have previously occurred before de-Europeanisation can take place (Copeland, 2016: 4), the analysis begins with the process of Europeanisation in the UK's agri-food regulatory regime. The project conceptualised Europeanisation as a three-dimensional construct affecting

domestic policies, politics, and polities. Drawing on Risse et al. (2001) and Borzel & Risse's (2003) models, policy and institutional 'misfit' between the EU and member states' scenarios is the starting point in analysing domestic change. Thus, the lower the compatibility between EU and domestic processes, policies, and institutions, the higher the need for adaptational pressure. However, as argued by recent scholars, misfit is not a sufficient condition to instigate change on its own (Buller, 2006; Mastenbroeka & Kaeding, 2006: 331; Featherstone & Radaelli, 2003). Therefore, complementing this model with the three strands of the new institutional theory brings in parallel mechanisms and different factors facilitating domestic adaptation in response to Europeanisation.

From a historical institutionalist perspective, the thesis traces the development of formal and informal rules, procedures, norms, and practices of EU and UK agri-food regulatory regimes. Also, from a sociological institutionalist point, it analyses the interactions among agents and actors across the various levels of government within the EU, how it brings about institutional change and how it aids in creating new institutions at domestic level. Thus, this analytical framework entails deliberate regulatory decisions taken in the past (through the logic of consequentiality) and how the interaction among actors within the EU has shaped the goals, interests, and preferences of domestic stakeholders (through the logic of appropriateness) in the agri-food sector. The study uses Borzel and Risse's threefold typology (*see* section 3.2.1) to categorise the extent of Europeanisation: Absorption (Low), Accommodation (Modest) and Transformation (High).

The study also uses historical institutionalists' concepts of stability (path dependence) and change (critical juncture) to frame and connect Europeanisation to de-Europeanisation. This conceptualisation serves as a practical analytical framework to look at the process of institutional change and the role of antecedent factors in building new institutions for agri-food governance in the UK. It also provides an explanatory framework to analyse the past, present, and future relationships between the EU and the UK's agri-food regulatory regimes. Particularly, the concept of path dependence helps explain the intervening effects of the

historical institutional paths (created as a result of decades of regulatory harmonisation) on the preferences of domestic actors and internal institutional conditions. The study also considers the influence of external factors, such as trade deals with third countries and global treaties, on the choice of dismantling strategies or de-Europeanisation decisions. Thus, the thesis models the choice of dismantling strategy or the outcome of de-Europeanisation as a function of actor preferences, internal institutional constraints and opportunities, the Brussels effect, and global opportunities and constraints.

The new institutional theory is also engaged to analyse the cause and effect of each of the explanatory variables to predict the dismantling decision or outcome of de-Europeanisation. In analysing domestic stakeholder preferences, the study consider how formal and informal rules and norms have shaped the various actors in the agri-food sector in the past decades. The framework also captures the current and prospective EU agri-food rules, norms, practices as the Brussels' effect. It also includes international treaties governing agri-food trade, such as the World Trade Organisation's (WTO) sanitary and phytosanitary (SPS) measures, codex alimentarius' standards, and regulatory culture of UK's trading partners (as global opportunities and constraints. The study uses a five-point scale: very weak, weak, moderate or balanced, high, and very high, to measure the impact of each variable on the expected outcome of de-Europeanisation. The analysis factors in the temporal dynamics of these institutional variables in predicting the future dynamics and outcomes of dismantling or alignment with the EU. That is, changes in any of these institutional variables over time will affect the possible dismantling or alignment decision.

4.8 Reflections on the PhD Process

This project encompasses three broad themes: Brexit, scientific expertise, and agri-food governance. The research themes transcended multiple disciplines, including politics, science, and technology studies (STS), geography and public policy. Also, each theme

entailed several elements, concepts, and sub-themes, making them challenging to map, link and explore. Therefore, the research began with a rigorous literature review and systematic mapping to understand the theories and concepts under each theme and frame them in a proper interdisciplinary context.

I encountered three main challenges aside from the general difficulties that every PhD student may face. The first challenge was researching such a 'nationalistic project' as Brexit as an international student. I was mostly the only international student at research conferences and symposiums on Brexit and was constantly asked, 'why Brexit?'. This situation may have influenced the recruitment of participants, especially those with strong opinions and nationalistic ideologies. However, with the support of my supervisors, the Grantham Centre for Sustainable Futures, and the networks I built through seminars and conferences, I could recruit participants with the right knowledge and expertise for the project. Equally, my position as an international student outside the EU helped me in my positionality and reflexivity – to position myself outside the research without preconceived ideas or biases about Brexit.

The second challenge was the uncertainties surrounding Brexit – from the time of the referendum in 2016 to the final day of exit in 2020. I started my PhD in October 2018, when the withdrawal process and the post-Brexit trade negotiations had just begun. By March 2019, UK Prime Minister Theresa May's post-Brexit trade deal with the EU had been rejected three times by UK's parliament – leading to her resignation in May 2019. In October 2019, the Parliament voted for an early general election after the new Prime Minister, Boris Johnson, failed to get parliamentary approval of his trade deal with the EU. The manifestos and campaigns of the major political parties – the Conservatives pledged 'to get Brexit done', the Labour Party's plan for a 'soft Brexit' and the Liberal Democrats plan 'to stop Brexit' – opened up wide-range possibilities for the future UK-EU relationships. These uncertainties affected the design of my research. To address this challenge, I developed a multiple scenarios framework – involving a no-Brexit, a no-deal-Brexit, and Brexit-with-a-deal scenarios. The final

and actual research framework was adopted when the UK-EU Trade and Cooperation Agreement (TCA)[7] was agreed upon on the 24th of December 2020.

Lastly, the Covid-19 pandemic and the subsequent lockdowns in the UK affected my research plans in several ways. My initial research plan was to conduct face-to-face interviews between April 2020 and April 2021. However, the UK government announced the first lockdown in March 2020. This development compelled me to change my interviews from face-to-face to online interviews using Zoom, Microsoft Teams and Google Meet. The main challenge was recruiting participants, as most people became more concerned about their wellbeing and less responsive to work-related invitations. I relied mainly on the contacts I built from conferences, my supervisors' referrals, and snowballing approach to recruiting the participants. Some stakeholders also directed me to their websites and places where I could get credible secondary materials as substitutes for the interview.

[7] See Section 6.2.2 for the details of the UK-EU TCA

CHAPTER FIVE: SCIENTIFIC ADVICE AND EVIDENCE FOR POST-BREXIT AGRI-FOOD GOVERNANCE

5.1 Introduction

This chapter presents the analysis of the challenges and opportunities Brexit presents for the production, integration, and use of scientific evidence in agri-food regulatory policymaking. The chapter discusses the implications of the transfer of risk assessment and other advisory functions from EU agencies to the UK on post-Brexit agri-food regulatory governance in the UK. The analysis is divided into two main parts addressing the first and second objectives of the thesis. The first part examines the strength and capacities of the UK's scientific agencies in terms of funding, expertise, and facilities to produce proactive and credible evidence to support agri-food regulatory decisions. The second part discusses the source and causes of public mistrust, scientific uncertainties and policy ambiguities in the existing EU/UK regulatory regimes and how they will affect post-Brexit regulatory governance.

Part I: THE INSTITUTIONAL CAPACITY OF UK'S SCIENTIFIC AGENCIES

'Since EFSA was set up and took an increasing role in food safety policymaking, resources to the Food Standards Agency have been cut. The budget has been cut; personnel have been cut. It [FSA] is a shadow of its former self.' – S3 (Food Policy Expert)[8]

'The UK is very strong scientifically and has a huge amount of a very strong university base. We have a very strong research institution base and a very strong track record of experts quite willing to work on government committees…I am confident that there will not be a problem if science continues to have the investment, the presence, and the kind of interest, that it has had historically' – G1 (Food Standards Agency)[9]

[8] S3, Interview, 16 Feb. 2021.
[9] G1, Interview, 14 Jun. 2020.

5.2 A Brief Overview

The decades of regulatory integration with the EU led to the delegation of a significant amount of risk assessment and scientific advisory functions from the UK to EU agencies.[10] EU institutions also became the hub of the harmonised advisory systems connecting the UK with competent agencies of other countries. This arrangement facilitated collaboration and sharing of best practices and scientific facilities. However, Brexit and the European Union Withdrawal Agreement (EUWA)[11] reverts the regulatory authority, including scientific risk assessment functions, from the EU to UK institutions. Moreover, the EUWA and UK-EU Trade and Cooperation Agreement (TCA) allow the UK to collaborate and interact with EU institutions and research programmes. The following sections analyse the challenges of the disconnection from EU institutions and the drivers, opportunities, and barriers to the possible alignment with EU advisory structures post-Brexit.

5.3 Funding for Research and Development (R&D)

Research and Development (R&D) funding is critical in designing effective science-based regulatory regimes. Government departments and agencies need comprehensive funding regimes for science research and innovation to remain proactive in addressing the looming issues such as food safety threats and the risk of novel technologies in the agri-food sector. For instance, the Philips Inquiry Report on the BSE crises[12] cited the reduction in funding for animal diseases research as one of the factors that affected the proactiveness of the then Ministry of Agriculture, Fisheries and Food (MAFF) in dealing with the BSE crises from the initial stages. This section analyses the dynamics of R&D expenditure by government departments and agencies, the post-Brexit funding strategies, and their implications for the agri-food sector.

[10] Refer to chapter 6
[11] Refer to section 7.2.1 for detailed discussions of the EUWA
[12] Refer to section 6.2.4 for discussion on the Philips Inquiry Report

5.3.1 Domestic R&D Funding for Government Departments and Scientific Agencies

The analysis of the UK government's gross expenditure reveals that the R&D expenditure for all the major departments responsible for agri-food regulatory governance declined progressively between 2007 and 2018. As illustrated in figure 7.1, DEFRA's R&D expenditure at constant prices fell from £230 million to £56 million, representing a 76% decrease. For FSA, the R&D expenditure fell from £18 million to £2 million, representing an 89% decrease, whereas that of HSE fell from £15 million to £6 million, representing a 60% decrease. The analysis suggests that these reductions were driven mainly by the broader economic environment, especially the 2007-2008 global financial crises and the subsequent spending review by the UK government. As S3, an expert in regulatory science and food policy, explains:

> *'…the decline in support for departmental R&Ds can be traced as far back as the Barnes report in 1986, which suggested that research should largely be focused on a near-market basis…there has been over 20 years of considerable decline in research funding for the various departments regardless of which party is in power. However, in the past decade, we have witnessed a nosedive…The 2007 financial crisis and the subsequent austerity measures introduced by the Conservative Government are the prime cause of this worsening situation.'*[13]

Some experts also suggest that the transfer of regulatory functions to the EU made some UK agencies redundant. Given that the more significant part of risk assessments was done at the EU level, there was no need to replicate the same in the UK. Thus, the UK became more dependent on the EU's regulatory science, which is reflected in the decline of R&D funding for departments, such as HSE and FSA, which were initially in charge of risk assessments. As S3 puts it:

[13] S3, Interview, 16 Feb. 2021

> '*Since EFSA was set up and took an increasing role in food safety policymaking, resources to the Food Standards Agency have been cut. The budget has been cut; personnel have been cut….*'[14]

The analysis shows that some government departments resorted to industry-funded research to compensate for the funding gap. For instance, the then-Chief Scientific Adviser of DEFRA, Professor Ian Boyd, confirmed that industry was funding a study on neonicotinoids and pollinator bees because DEFRA lacked the financial capacity to carry out that research. According to him:

> *'…these are very big and very expensive studies to carry out and, from a public funding point of view, if you wanted totally independent public funding you would be talking about asking organisations like the Natural Environment Research Council to fund it as well as carrying it out. Bayer and Syngenta have asked them to carry it out and they have provided the funding, but otherwise, the funding would need to come from a public source and at the moment that public source is not available.'*[15]

However, there are concerns from some stakeholders and the public about the possibilities for 'regulatory capture' if the government relies on industrial actors to fund research meant to regulate the same sector. For instance, the Environmental Audit Committee of the House of Commons objected to the private sector funding of critical regulatory research such as the neonicotinoid regulations. In their report on the *'National Pollinator Strategy'*, they emphasised that:

> *'…Less welcome is DEFRA's reliance on industry to fund critically important research. It is symptomatic of DEFRA's loss of capacity to deliver its environmental protection obligations and might result in greater susceptibility to commercial, rather than*

[14] S3, Interview, 16 Feb. 2021.

[15] *See* House of Commons (2014). 'Oral evidence: National Pollinator Strategy, HC 213'. http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/national-pollinator-strategy/oral/10709.pdf. Accessed 19 Oct. 2021

scientific, research priorities. That becomes a particular weakness where the industry-funded research is intended to contribute to a review of the ban on neonicotinoids. It is important that the design of that research and how it is undertaken and reported is independent of its paymasters and is transparent.'[16]

The analysis further indicates that some departments and agencies also rely on fees and charges to the industry on regulatory services as a source of funds for their regulatory activities, especially when the UK was part of the EU multilevel regime. For example, in 2018/19, the Veterinary Medicines Directorate (VMD) report showed that it fully recovered its costs for authorisations and inspections through fees and charges to the industry, with a net income of £147,000.[17] However, this raised questions about the future funding capacities for those regulators since the companies from the EU will no longer be using the services of UK agencies. As C1 of the Alliance to Save Our Antibiotics argues:

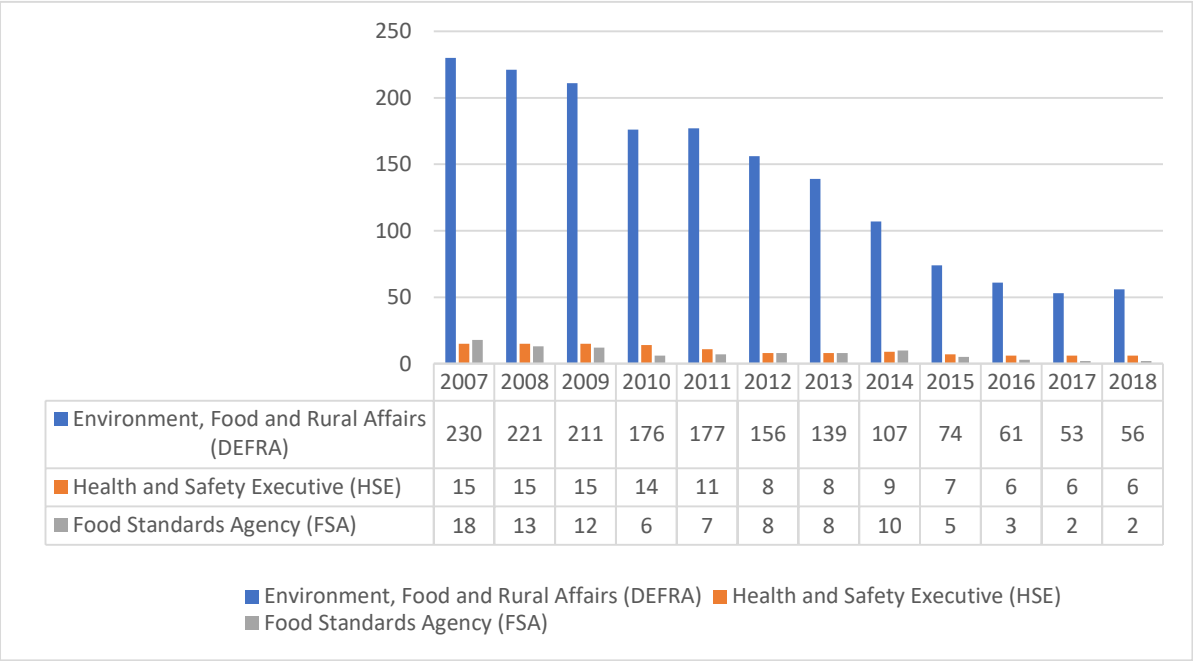
'And there is a decentralised method [in the EU veterinary medicines approval process]…the pharmaceutical companies get to choose which regulator [member state] assesses the dossier…there is a fee that pharmaceutical companies have to pay, but most of that goes to the member state that has been chosen to assess the dossier…in the UK, the fee goes straight to the regulator… and the VMD gets 50% of its money through this process, so its own survival relies on getting pharmaceutical companies to choose it as the assessor…Now with Brexit, a lot of this is going to change, and I don't know how exactly it is going to change because the UK has now left the EMA…and I don't know exactly how the VMD is going to continue to fund itself.'[18]

[16] *See* House of Common (2014). Environmental Audit Committee's (EAC) report on 'National Pollinator Strategy.' https://publications.parliament.uk/pa/cm201415/cmselect/cmenvaud/213/213.pdf. Accessed on 02 October 2021

[17] *See* VMD (2019). Veterinary Medicines Directorate Annual Report & Accounts 2018/2019. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/910108/1498950-v22-VMD_Annual_Report___Accounts_2018_19_FINAL-accessible.pdf Accessed on 07 Sept 2021

[18] C1, Interview, 10 Jun. 2020.

Figure 5.1: UK Government Net Expenditure on R&D by department: 2007-2018 (In £ Million at 2018 Constant Prices)



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Environment, Food and Rural Affairs (DEFRA)	230	221	211	176	177	156	139	107	74	61	53	56
Health and Safety Executive (HSE)	15	15	15	14	11	8	8	9	7	6	6	6
Food Standards Agency (FSA)	18	13	12	6	7	8	8	10	5	3	2	2

Source: Derived from ONS Data on R&D Expenditure[19]

5.3.2 The Significance of EU Research Funding

The analysis shows that, although EU funding has been around 3% of the UK's total R&D expenditure,[20] it plays a significant role in the UK's research ecosystem. First, the strong research and University base in the UK enabled the UK to secure relatively more R&D funding from the EU than other member states. Thus, the UK often receives more than it contributes to the EU research fund. For instance, between 2007 and 2013, the UK received a net surplus of 3.4 billion euros from the EU Framework Programme (FP7)[21] – it contributed 5.4 billion euros and received 8.8 billion euros.[22] Also, for Horizon 2020,[23] the UK contributed about 11.4% of the overall budget (almost 80 billion euros) and received around 12.1% of the

[19] See ONS (2019). Gross Domestic Expenditure on Research and Development Time Series.
[20] Royal Society (2015).
[21] The Framework Programme (FP7) was the EU's research funding programme from 2007 to 2013, with a total budget of 50.5 billion euros.
[22] *See* European Commission (2015). EU expenditure and revenue 2007 – 2013. *http://ec.europa.eu/budget/figures/2007-2013/index_en.cfm. Accessed on 6 October 2020*
[23] Horizon 2020 was the EU's research and innovation funding programme from 2014-2020, with a nearly 80 billion euros budget.

funding.[24] At the time of Brexit, the UK had the highest share (11%) of organisations on EFSA's Article 36 List[25] of competent authorities.[26] Also, between 2009 and 2016, the UK beneficiaries received 23% of the total EFSA grant budget.[27] The value of contracts signed under EFSA science procurement with UK contractors was 19% of the total budget.[28] This analysis confirms that the UK scientific agencies benefited significantly from EU research funding both directly from agencies and through research framework programmes.

Also, the EU R&D frameworks are typically designed to support collaborative research, which is evident in the proportion of budgets awarded to collaborative projects and research activities. For example, the 'Research and Innovation Actions' and 'Innovation Actions' in the Horizon 2020 required participants from at least three different Member States.[29] The FP7 and Horizon 2020 also earmarked 1.85 billion euros[30] and 2.4 billion euros[31] for research facilities to ensure that researchers from different countries have access to shared facilities. These arrangements enhanced scientific cooperation and cross-border collaboration between the UK and other EU countries. It also strengthened UK's domestic research facilities and attracted top researchers and scientists from other EU member states, which in turn improved knowledge sharing and enriched the wider research ecosystem of the UK. For instance, under the FP7, 107 science facilities in the UK received financial and related support from the EU to grant access to researchers from other countries.[32] The FP7 also supported 3,539 researchers in the UK to access 1,055 European research facilities.[33] As S10, science policy expert, recounts:

[24] *See* European Commission (2021). Horizon 2020 programme analysis**.**
[25] Article 36 List of Competent Organisations is the list of organisations eligible to receive grants from EFSA.
[26] Detken, D. (2017). Update on BREXIT activities at EFSA. 66th Advisory Forum meeting, EFSA. Parma. 5-6 December 2017
[27] Detken, D. (2017). Cit. Loc. n. 288.
[28] Detken, D. (2017). Cit. Loc. n. 288.
[29] *See* European Commission (2021). Cit. n. 286 above.
[30] *See* European Commission (2015). Cit. n. 284 above.
[31] *See* European Commission (2021). Cit. n. 286 above.
[32] *See* European Commission (2015). Cit. n. 284 above.
[33] *See* European Commission (2015). Cit. n. 284 above.

'And, especially for the UK, because of our strong research base, we have been receiving a lot of these infrastructural supports from the EU to grant access to researchers from other countries...this, in turn, strengthens our local research facilities…If we are to pull away from these programmes, it will have knock-on effects on the entire research landscape, including the recruitment of international scientists and researchers….'[34]

The collaborative nature of EU research programmes also helped the UK and other Member States to achieve economic efficiency and economies of scale.[35] For instance, large scale research which could be difficult for an individual Member State to finance, such as the case of the neonicotinoid (mentioned in section 7.3.1 above), become less burdensome when resources are pooled together from all Member States and participating members. Also, participation in EU research programmes makes research on issues such as AMR and most food safety issues which are not geographic-specific cost-efficient. Through the EU programmes, the cost is shared and each of the participating members enjoys the same level of benefit from the research. The EU research programmes also help to avoid duplication of projects among member states, which in turn ensures cost-effectiveness.

Also, cross-border research has been identified as integral in ensuring sustainability in sectors with globalised supply chains, such as agri-food. It enhances networking and knowledge sharing among researchers. As S1, an AMR and policy researcher, explains:

'We have come to believe that it is always better to have a transnational perspective, especially with AMR research...I, for instance, have done so many works that would not have been possible without the EU partnership…Because I usually look for

[34] S10, Interview, 17 Feb. 2021.

[35] Economies of Scale refers to the advantages entities experience when production becomes efficient.

isolates[36] from other countries…So, I often collaborate with the French AMR centre in Lyon; this collaboration has been made possible with the help of the EU'.[37]

G3, an AMR researcher and DEFRA Committee on AMR member, also added:

'I hope that after Brexit, we can still get involved in European projects because for antimicrobial resistance, to sit at your own corner does not really cut it….'[38]

5.3.3 The Post-Brexit R&D Funding Plans of the UK

The UK government has launched some initiatives to increase the budget for R&D to enhance its research capacity post-Brexit. Between 2020 and 2022, the government increased its funding for R&D by £1.75 billion, taking it to an overall total of £14.9 billion.[39] It also promised to raise the R&D-GDP ratio from the pre-Brexit level of 1.7% to 2.4% by 2027 and increase the R&D budget to £22 million.[40] Specifically for the agri-food sector, DEFRA and the UK Research and Innovation (UKRI) launched the 'Farming Innovation Programme (FIP)' with over a £20 million budget to support research, innovation and development in the sector.[41]

Also, the TCA allows the UK to participate in the EU's research funding programmes subject to its commitment to financial contribution and fair treatment of research participants. The current EU research programme, Horizon Europe has a budget of 95.5 billion euros and runs from 2021 to 2027.[42] The UK's financial contribution will consist of an operational contribution

[36] Isolates in microbiology refer to a culture of microorganisms isolated for study.
[37] Interview, S1, 25 Nov 2020.
[38] Interview, G3, 27 Nov 2020.
[39] *See* BEIS (2021). £250 million additional funding to boost collaboration and protect ongoing research. Press Release. https://www.gov.uk/government/news/250-million-additional-funding-to-boost-collaboration-and-protect-ongoing-research Accessed on 21 December 2021.
[40] *See* BEIS (2021). Cit. Loc. No. 301
[41] *See* DEFRA (2021). Farming Innovation Programme launched to boost the future of farming. https://www.gov.uk/government/news/farming-innovation-programme-launched-to-boost-the-future-of-farming. Accessed on 20 December 2021.
[42] *See* European Commission (2021). Horizon Europe: The EU Research & Innovation Programme 2021 – 27. https://ec.europa.eu/info/sites/default/files/research_and_innovation/funding/presentations/ec_rtd_he-investing-to-shape-our-future_0.pdf. Accessed on 13 September 2021.

covering operational expenditure; and a participation fee that covers the administrative costs. Moreover, the programme will use correction mechanisms to balance any significant differences between the UK's operational contribution and what it receives from the programme. This mechanism means that the UK cannot be a net receiver of the research programme that it used to enjoy when it was a member (as mentioned in section 5.3.2 above). The UK government agreed to participate in the Horizon Europe framework programme. As the Department for Business, Energy and Industrial Strategy (BEIS) indicated in a press release in April 2021:

> *'The UK will associate to Horizon Europe as part of the Trade and Co-operation Agreement (TCA) with the EU. We will pay a fair and appropriate share into the budget of this programme to enable the UK science and research sector to further their collaborations with our European partners. Horizon Europe will be at least 20 percent larger than the previous framework programme, giving UK scientists and innovators access to the largest collaborative funding scheme in the world."*[43]

However, at the time of writing this thesis – between January 2022 and July 2022 – the UK's participation in Horizon Europe had not been finalised. The House of Lords European Affairs Committee described the delay as 'mutually damaging' to the benefits of scientific cooperation between UK and the EU.[44] The Committee stressed that 'the causes of the current impasse are political, not functional, with Horizon Europe association being treated as a negotiating pawn in the context of wider difficulties in the UK-EU relationship'.[45] In July 2022, the UK

[43] *See* BEIS (2021). Cit. Loc. No. 300

[44] *See* UK Parliament (2022). Delay to Horizon Europe association damaging to UK and EU research. https://committees.parliament.uk/committee/516/european-affairs-committee/news/161457/delay-to-horizon-europe-association-damaging-to-uk-and-eu-research/

[45] The House of Lords European Affairs Committee (2022). The UK's Participation in the Horizon Europe Programme. A letter to the Secretary of State for Foreign, Commonwealth and Development Office. 3 March 2022.

government unveiled the so-called 'Plan B' R&D package as an alternative to Horizon Europe in case the UK's association to the EU's framework is not successful.[46]

Two significant issues that emerged from the interviews with the experts and researchers concerning the UK's post-Brexit R&D funding plans were 'clarity' and 'stability'. Some of the experts interviewed expressed that the government must be clear on how it intends to cover the cost of association with Horizon Europe. They contend that the participation and operational fees to Horizon Europe should be separate from the funds earmarked for domestic R&D. As S10, a science policy expert, argues:

> *'The news that researchers will be able to participate fully in Horizon Europe really gives an important reassurance for us as UK-based researchers…However, what needs to be clear is how the government is going to fund the participation and operational fees, which are estimated to be around one billion...Earlier this year, the government announced an additional 250 million to boost collaboration; the question is are we going to take money from the funds already earmarked for domestic R&Ds to cover the cost of participation?... In my opinion, I do not think our participation in EU research programmes should be met at the expense of domestic R&D funding…'*[47]

Some researchers also contend that the government must provide further details on how it seeks to ensure that the so-called 'Plan B' matches the benefits of Horizon Europe and the mitigation plans against the costs of non-association. As requested by the House of Lords European Affairs Committee in a letter to the then-Secretary of State for Foreign, Commonwealth and Development Office:

> *'In the absence of association, can the Government provide further details on its so-called "Plan B" option? How will the Government seek to ensure that "Plan B" matches*

[46] BEIS (2022). Supporting UK R&D and collaborative research beyond European programmes. Policy paper. 20 July 2022. https://www.gov.uk/government/publications/supporting-uk-rd-and-collaborative-research-beyond-european-programmes

[47] S10, Interview, 17 Feb. 2021

as many of the benefits of Horizon Europe as possible, and mitigates against the costs of non-association...Does the Government have plans to extend its funding guarantee to existing applicants to Horizon Europe?'[48]

There were also concerns about the long-term commitment of the government to reaching and sustaining the 2.4% R&D investment to GDP ratio. This concern is valid in the context of constant changes in UK's political leadership. To achieve this target, there must be a strong integrity from all parties to commit to the target irrespective of the leader or government in power. As S10, a science policy expert, explains:

'…The other thing that needs to be clear is the other longer-term questions on how the government is going to achieve its commitment to increasing the UK's investment in R&D to 2.4% of GDP by 2027. For this to be possible, the UK must retain its integrity irrespective of who is in power. Such commitment is crucial for the scientific community….'[49]

S3, an agri-food policy expert, added that:

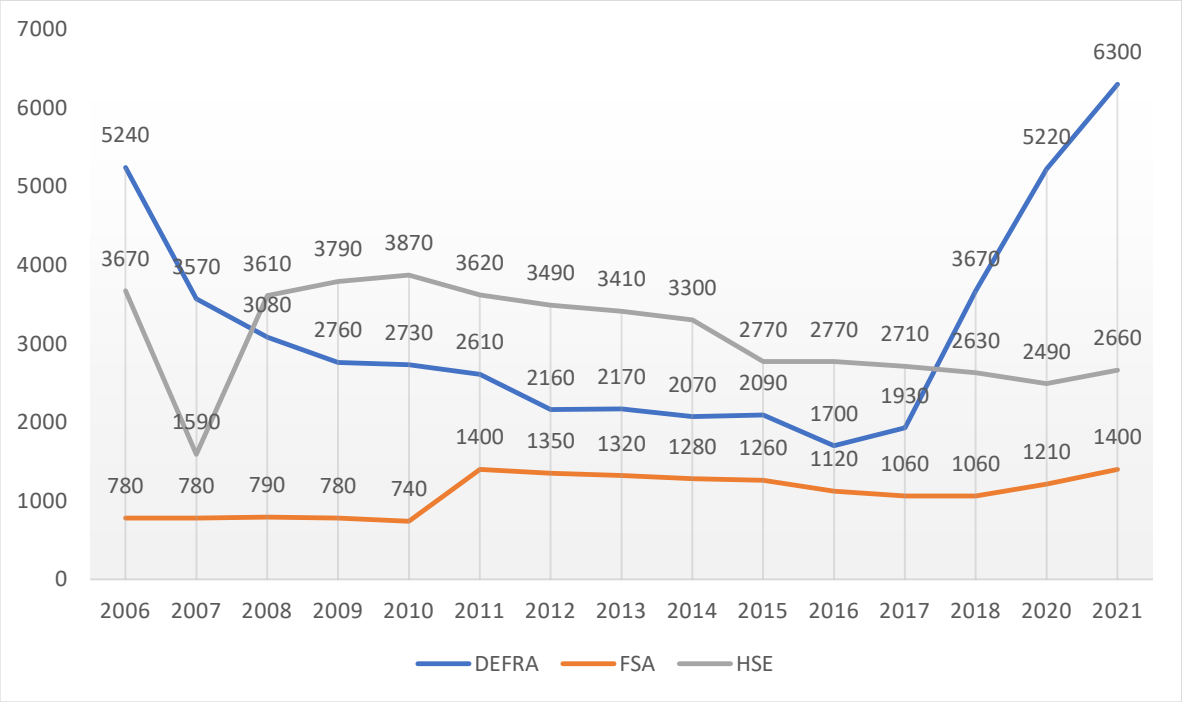
'To me, I think the main thing is about stability…The government must demonstrate how serious it is about its longer-term commitments… The BSE crises and COVID-19 have taught us the importance of long-term investment in science and research… I have heard about DEFRA's Farming Innovation Programme, which I think is a good thing for the sector, but…there should be a commitment and a clear strategy from the government on how to sustain it.'[50]

[48] The House of Lords European Affairs Committee (2022). The UK's Participation in the Horizon Europe Programme. A letter to the Secretary of State for Foreign, Commonwealth and Development Office. 3 March 2022.
[49] S10, Interview, 17 Oct. 2021.
[50] S3, Interview, 16 Feb. 2021.

5.4 Expertise and Staff Strength

Figure 7.2 confirms that the staff strength of the various departments in charge of the agri-food sector, particularly DEFRA, rose sharply after Brexit. The figure shows that between 2006 and 2016, the staff strength of DEFRA fell from 5240 to 1120, representing about a 68% reduction. However, between 2016 and 2021, when the UK officially left the EU, DEFRA increased the number of workers massively from 1120 to 6300, representing about a 17% rise above the 2006 level and over 450% increase above the pre-Brexit levels. The FSA also reduced its staff strength from 1400 in 2010 to 1060 in 2017; however, in 2021, the number rose back to the 2010 level.

Fig. 5.2: The Trend of Civil Service Employment by DEFRA, FSA and HSE (2006-2021)



Source: Derived from the ONS Data for Public Sector Employment.[51]

[51] See ONS (2021). Public Sector Employment Data. https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/publicsectorpersonnel/datasets/publicsectoremploymentreferencetable

The analysis affirms that the increase in the staff strength was to help domestic departments and agencies expand their capacity to assume the responsibilities that were being transferred back to the UK and address other Brexit-related challenges. The findings further show that there were other internal arrangements such as inter or intra-departmental transfer of experts to augment certain areas of concern. For instance, about 900 workers were transferred from the Environment Agency to DEFRA in 2017.[52] As G2 from the Department of International Trade explains:

> *'…at the time of the referendum, there were nearly not enough experts within the UK in the right areas... But there have really been big strives forward, in terms of hiring the right amount of people, and making other internal adjustments to make sure right people go to the right places or where they are needed at most.'*[53]

G1 from FSA also added that:

> *'…organisations like the FSA have dramatically increased the number of in-house risk assessors. The number of staff who are professional risk assessors has been more than doubled. Similarly, our scientific advisory committees… have also increased their numbers dramatically. So, the scientific institutional capacity has been enhanced dramatically - more than doubling… We also anticipate that, if EFSA no longer wants so much UK presence in Europe, those individuals [UK representatives] can come back and sit on UK committees.'*[54]

However, some of the experts interviewed in this research expressed concerns about the downside of the 'hiring spree' and the frequent transfer of staff from one area of expertise to another. They argue that experts are not created overnight; therefore, mass recruitment to deal with the Brexit crisis may amount to 'dumbing down' expertise. Also, the frequent transfer

[52] See ONS (2018). Public Sector Employment Data. December 2017 https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/publicsectorpersonnel/datasets/publicsectoremploymentreferencetable

[53] G2, Interview, 10 Oct. 2020.

[54] G1, Interview, 14 Jun. 2020.

of staff across departments and units will not allow recruits or those at the junior level to develop the right level of expertise in time. There is also concern about getting the right level of supervision for the large number of staff employed at the junior level for them to deliver effectively. As S12, an expert in agri-food regulations, pointed out:

> *'DEFRA, between 2005 and 2015, lost two-thirds of their staff, and after the referendum in 2016, there has been a hiring spree but mostly hiring people at a junior level... the problem is… you cannot have experts overnight, …and especially, for all these expertise jobs most of these were done at the EU level, and those that were interested moved to Brussels...'*[55]

C2 from the Chartered Institute of Environmental Health also added that:

> *'…I do not think the proposals that the government is putting forward at the minute are the answer…their answer is to do away with professional qualifications…to dumb them down to try and bring a whole lot of people into the workforce rapidly who are not sufficiently professionally qualified. They seem to have not considered the concept of supervision...I think there are all sorts of problems in the future with what the current proposals contain.'*[56]

S7, an expert in food regulations and EU laws, added:

> *'…we also have a need for new people not merely to fill the current gaps but also, for instance, to deal with the new borders, and the new criteria for evaluation when we get new products coming in/out - so it is not just risk assessment in authorising products - like the overarching risk assessment. It might not look that important, but anything that puts pressure on the system takes away the capacity to do the risk assessment.'*[57]

[55] S12, Interview, 20 Aug. 2020.
[56] C2, Interview, 17 Feb. 2021.
[57] S7, Interview, 20 Aug. 2020.

5.5 Scientific Coordination and Collaboration

The growing integration of agri-food systems warrants a coordinated and collaborative effort to proactively address any food safety threat that emerges along the value chain. This entails vertical collaboration with departments and agencies across different levels of government and also coordination among and within various agencies at the same level. For instance, the Philips Inquiry report cited the lack of coordination between MAFF and the DoH as one of the main reasons for the BSE crisis. Before Brexit, EU agencies served as the fulcrum connecting the UK to several scientific facilities and institutions across the EU and beyond. This section analyses the effects of detaching from the EU advisory system and measures put in place by the UK to ensure internal and external coordination and collaboration.

5.5.1 Internal Coordination

Coordination between scientific institutions, regulatory agencies, and departments in charge of agri-food across the devolved nations was acknowledged by all the experts and stakeholders interviewed as indispensable in ensuring a proactive science-based regulatory regime. EU membership helped the UK to achieve internal coordination within the regulatory regimes studied in diverse ways. For instance, the EU's Rapid Alert System for Food and Feed (RASFF) aided the exchange of information on food safety risks and hazards between the food safety agencies in the devolved nations (Food Standards Agency (FSA) and Food Standards Scotland (FSS)). Also, for the pesticide and veterinary medicines regulatory regimes, the EU's centralised system[58] ensured a uniform risk assessment and management procedures among all Member States, including the devolved nations.

The analysis revealed that there would be challenges concerning internal coordination among the scientific institutions across the devolved nations due to Brexit. The first major issue is in

[58] See sections 6.4.3 and 6.4.4

relation to the NI Protocol, which enjoins Northern Ireland under the EU regulatory regime. Under the arrangements, NI [UK] labs and agencies will lead in testing and assessment. However, they will be operating under EU rules and guidelines. A divergence from EU regulatory and risk assessment procedures will therefore mean a different assessment regime for NI and another for GB, which will, in turn, disrupt internal coordination. For instance, in the area of pesticides and antibiotics, the EU risk assessment and MRLs rule apply to NI products. Thus, a divergence from EU regulations and guidelines will cause GB and NI to have a different assessment and testing regimes. As S7, an expert in food regulations and EU laws, contends:

> *'…There is going to be a level of scepticism and extra testing that will be required. NI agencies and labs will be undertaking a large part, but the final responsibility is left with the EU labs. The NI protocol specifies that the lead lab should be the EU lab…And this is where the coordination issue comes in; while NI labs and agencies are part of the broader UK network, they will be following a different testing regime….'*[59]

Also, given that agriculture and food policies are under the remit of the devolved administrations, any divergence in policy outlook may affect internal consistency and coordination. The analysis of the interviews with the experts and stakeholders revealed that most of the post-Brexit agri-food regulatory policy discussions in the UK had not taken a coordinated approach. For example, the consultation on gene editing technologies[60] – to gather views on whether the products of genetic technologies should continue to be regulated as GMOs – was only conducted and focused on England. Also, the lift of the ban on neonicotinoids for emergency use in 2021[61] was only for England. The analysis also revealed

[59] S7, Interview, 20 Aug. 2020.
[60] DEFRA (2021). Genetic technologies regulation. Consultation Outcome. https://www.gov.uk/government/consultations/genetic-technologies-regulation
[61] DEFRA (2021). Neonicotinoid product as seed treatment for sugar beet: emergency authorisation application. Decision. https://www.gov.uk/government/publications/neonicotinoid-product-as-seed-treatment-for-sugar-beet-emergency-authorisation-application

that there had been cases and instances where FSS failed to coordinate with FSA because of different regulatory outlooks. As S9 recounts:

> *'…So, we have this thing called "the food and you survey", which is across the UK, but it is increasingly hard to do that and to get Food Standards Scotland [FSS] on board… it is just one example, but there are lots of cases like that where Food Standards Scotland will say why should we collaborate, we are not doing the same job anymore, or if we are going to collaborate, we must collaborate with the Department of Health with Public Health England. So…the need for harmonised food safety and other regulations is an ideal world, but I think we are a long way from it, and I was to say I think the direction of travel at the moment isn't favourable to that.'*[62]

The UK passed the Internal Market Act in 2020 to prevent internal trade frictions and barriers that may result from regulatory differences among the devolved nations. The Act includes the so-called 'mutual recognition principle',[63] which states that goods made or imported into one part of the UK can be sold in any other part without any further regulatory restrictions of the destination country once the goods meet the relevant requirements of the originating country. This principle implies that in the case of internal regulatory divergence, goods will still be able to move freely without restrictions, provided they meet the regulatory requirements of the originating country. For instance, if England decides to remove the PRT ban but Scotland continues to maintain it, PRT-treated products from England will be free to move to Scotland without being subject to Scotland's regulations. This arrangement seeks to ensure that regulatory differences among the devolved nations will not affect the UK's internal market. However, the Act does not address the emergence of regulatory divergence or promote regulatory cohesion among the devolved nations. Therefore, the challenge of internal coordination between scientific and regulatory agencies may persist in future regimes.

[62] S9, Interview, 25 Jan. 2021

[63] *See* Section 2 of the UK Internal Market Act 2020

5.5.2 External Coordination and Collaboration

Most of the experts and stakeholders interviewed agreed that the UK needed to maintain a close relationship with EU scientific agencies, particularly EFSA. They contend that this relationship helps to safeguard the agri-food supply chains between the EU and the UK, which have already been interconnected. For instance, the EU's intelligent sharing database, RASFF, has been a vital tool for exchanging food safety information with EU countries enabling swift reaction to food safety risks and hazards.

Fig 5.3: Food Safety Alerts Raised by RASFF (2016-2020)

Source: FSA and IEU DMER (Vabistsevits & Lloyd, 2020)

Fig 5.4 Food Safety Alerts Raised by FSA (2016-2020)

Source: FSA and IEU DMER (Vabistsevits & Lloyd, 2020)

Figures 5.3 and 5.4 above give a graphical illustration of food safety alerts received on food and feed products imported into the UK between 2016 and 2020 from the RASFF and the UK's internal alert systems, respectively. The figure demonstrates that the UK depended on the RASFF far more than its internal alert system on food safety risk and hazard information. Thus, losing access to the RASFF will have a significant impact on food safety management in the UK.

The UK-EU TCA does not provide the UK with access to the RASFF but only receives third-country information from the system.[64] As an alternative, the UK has turned to other

[64] See COVID-19, EU Exit, and Future Food Strategies - Address to the Chartered Institute of Environmental Health. https://www.food.gov.uk/news-alerts/news/covid-19-eu-exit-and-future-food-strategies-address-to-the-chartered-institute-of-environmental-health

international systems, such as the International Food Safety Authorities Network (INFOSAN),[65] publicly available data and by setting case-by-case data sharing arrangements.[66] As explained by Emily Miles, the chief executive of FSA:

> *'We no longer have full access to EU data alerts, but we now link with more than 180 countries for food safety notifications while also receiving third-country notifications from the EU.'*[67]

However, most of the experts interviewed are of the view that the current arrangement is not enough to bridge the data gap between the UK internal alert systems and the RASFF. As C2 from the Chartered Institute of Environmental Health contends:

> *'…It took the RASFF several years to become this sophisticated…And after years of reductions in funding for environmental health, we simply do not have the capacity to meet these [data] shortfalls...Voluntary schemes like INFOSAN cannot clearly replace a more sophisticated system like RASFF…At the moment, there is simply no alternative to this system…'.*[68]

The FSA has confirmed that it requires a significant boost in resources in order to meet the ongoing shortfalls. As reported by the National Audit Office (NAO):

> *'FSA's initial estimate indicates it requires around 65% more FTE [Full Time Equivalent] resource to deliver the same international information exchange on food safety incidents now than it did using RASFF'.*[69]

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[65] INFOSAN is a global voluntary network of national authorities with a role in food safety, coordinated by a joint FAO/WHO Secretariat. National authorities of almost all FAO and the WHO Member States are part of the network. *See* https://www.fao.org/food-safety/emergencies/infosan/en/

[66] See FSA (2021). COVID-19, EU Exit, and Future Food Strategies - Address to the Chartered Institute of Environmental Health. https://www.food.gov.uk/news-alerts/news/covid-19-eu-exit-and-future-food-strategies-address-to-the-chartered-institute-of-environmental-health

[67] See FSA (2022). FSA Welcomes National Audit Office Report. News. 18 May 2022. https://www.food.gov.uk/news-alerts/news/fsa-welcomes-national-audit-office-report-0

[68] C2, Interview, 17 Feb. 2021.

[69] *See* National Audit Office (2022). Regulating after EU Exit. Report by the Comptroller and Auditor General.

As regards the PPP regulatory regime, some of the stakeholders interviewed expressed that the UK needs to negotiate access to EU data which has been compiled over decades to facilitate evaluation and assessment processes. As F1 of NFU Scotland contends:

> *'EFSA have this huge cover of research and evaluation done to assess impacts of different products on different things; we do not have access to that now. So, we are essentially starting from scratch… I think the priority has to be reaching an agreement on access to information.'*[70]

Also, the European Antimicrobial Resistance Surveillance Network (EARS-Net) – which connects about 700 laboratories and all the national surveillance systems of EU Member States[71] – has been a good source of data for AMR research and governance. However, at the time of writing, the UK had no agreement with the EU to remain part of the EARS-Net. As an alternative, the UK has become part of the WHO's Global Antimicrobial Resistance and Use Surveillance System (GLASS)[72] and the Central Asian and European Surveillance of Antimicrobial Resistance network (CAESAR)[73].

5.6 Summary of the Findings

The analysis showed that the institutional capacity of the UK's scientific agencies in charge of agri-food regulatory governance weakened appreciably in the decade before Brexit. To illustrate, the R&D funding for agencies responsible for risk assessment, including DEFRA, FSA, and HSE, declined significantly between 2006 and 2016. The EU research funding programmes and direct grants from EU agencies, such as EFSA, and service fees from

[70] F1, Interview, 27 Oct. 2020.
[71] *See* ECDC (2010). European Antimicrobial Resistance Surveillance Network. https://www.ecdc.europa.eu/en/about-us/networks/disease-networks-and-laboratory-networks/ears-net-about
[72] GLASS is a global collaborative effort to standardise AMR surveillance, created to strengthen knowledge through surveillance and research.
[73] CAESAR is a network of national AMR surveillance systems for all countries in the WHO European Region that are not part of the EARS-Net.

conducting EU activities played a significant role in the UK's research funding. The analysis revealed that the number of staff and experts in the three departments, DEFRA, FSA, and HSE, decreased substantially between 2006 and 2016. The UK also depended largely on the EU intelligent database and networks, such as RASFF and EARSNet, in managing food safety risks and AMR. However, there have not been arrangements to join these networks post-Brexit.

The analysis revealed that the UK government has put in place some measures to mitigate the capacity shortfalls of UK agencies. The government increased its overall funding for R&D substantially by £1.75 billion and pledged to raise it from £14.9 billion to £22 million by 2027. The government also made 'plan-B' arrangements to replace the EU R&D program, Horizon Europe if the UK's association is not successful. The analysis also showed that there had been a massive increment in staff and experts in risk assessments across all the departments since the Brexit referendum. The UK has also planned to improvise or replace the disconnection from EU networks, such as RASFF and the EARSNet, with other international systems, such as the INFOSAN and CAESAR.

The analysis suggests that, in spite of the arrangements put in place by the UK government, there still remain significant capacity issues for the post-Brexit agri-food regulatory regimes. In terms of funding, the discussions demonstrated that missing Horizon Europe will deny the UK the opportunity for collaboration and achieving economies of scale, which are essential for large-scale research. The analysis also showed that there would be challenges to internal coordination because of the NI protocol and the possibilities of the devolved administration pursuing different policy goals. Also, the UK might face the problem of 'data gaps' due to the disconnection from EU networks and databases, which will, in turn, affect its capacity to deal proactively with food safety threats emerging from global supply chains.

Part II: CHALLENGES OF INTEGRATING EVIDENCE IN REGULATORY DECISIONS

'Government science advisors are mostly involved in areas of science where there is a lot of uncertainty, and this is typified by the issue of neonicotinoids. UK government ministers always said they would be guided by the science about neonicotinoids...There are several problems associated with making science the sole guide to policy, one of which is that it can encourage people with a particular agenda, either overtly expressed or subliminal, to produce research biased towards their preferred outcome. I saw this happen throughout the neonicotinoid story.' – Ian Boyd, Former Chief Scientific Adviser for DEFRA (Boyd, 2018)

'My view is all regulatory decision-making is political; whatever scientific evidence is available, science can tell you what is known and not known, but it cannot decide policy. Policy decisions are always political and always have been…' – S3, Regulatory Science and Food Policy Expert[74]

5.7 A Brief Overview

In an open and liberal democratic environment, scientific evidence interacts and competes with other socio-economic norms in a complex manner (Gluckman & Wilsdon, 2016; Gluckman, 2016), affecting the nature of the evidence and how it influences policy decisions (Jasanoff, 2005; 2004). Chapter five discussed the origins and narratives around the creation of scientific agencies and committees in the EU/UK agri-food regulatory regimes. Chapter six highlighted that there had been differences in opinions and contestations among various stakeholder groups across multiple levels in almost all the selected cases. The following sections analyse the interaction between scientific agencies, stakeholders, the public and policymakers in the EU/UK regulatory regimes to produce, integrate and use evidence, focusing on the selected issues: PRT ban, neonicotinoids and AMR restrictions. The sections

[74] S3, Interview, 16 Feb. 2021.

also analyse the possible effects of the changing advisory and regulatory structures on the integration of evidence and how to enhance the use of evidence in post-Brexit agri-food regulatory regimes.

5.8 Legitimacy, Credibility and Trust

Science and Technology Studies (STS) and Public Policy literature emphasise the significance of legitimacy, credibility and trust in scientific institutions and evidence in science-based policy-making in modern societies. In liberal democracies, the effective delivery of regulatory policies largely depends on cooperation and acceptance by the public. Public acceptance of policies is also determined by their trust in the regulatory institutions and their perceptions about the credibility of the evidence. According to OECD (2022: 1), 'trust is the foundation upon which the legitimacy of democratic institutions rests.' Also, as Boyd (2018: 921) put it, 'regulation does not work unless it is trusted'.

5.8.1 Pre-Brexit Arrangements and Issues

The food safety crises in the UK in the 1990s caused public mistrust and loss of confidence in domestic advisory and regulatory institutions in charge of agri-food governance. Following the recommendations of the James Report and the Philips Inquiry, the government adopted measures to restore credibility and trust in the UK's agri-food regulatory regime. The key outcome was the creation of the Food Standards Agency (FSA) to serve as an independent non-ministerial government department responsible for consumer protection and food safety governance.[75] The FSA adopted accessibility, openness, and transparency as its guiding principle to help restore public confidence in the food safety regulatory regimes.[76]

[75] See section 6.2.3 for a detailed discussion on the James Report and the formation of FSA
[76] See section 6.2.3

However, the General Food Law and the creation of EFSA led to the transfer of the greater part of scientific risk assessment and regulatory authority from the UK to the EU level. The EU also adopted measures to ensure public trust in the regulatory mechanism. One of the key features of the EU's agri-food regulatory governance structure was the institutional separation of risk assessment from risk management – EFSA is in charge of the former, and the European Commission is in charge of the latter. This arrangement was to ensure that scientific institutions and advisory committees were independent of the government and the industry. EFSA opened their meetings to the public to ensure transparency and trust in the risk assessment and the scientific processes.[77]

The EFSA and the EU-wide risk governance model were commended by most of the experts and stakeholders interviewed. For the Food Safety regulatory regime, they indicated that public trust and confidence in the EU/UK arrangement increased significantly in the 'post-reform' period[78] compared to the 'pre-reform' periods.[79] As S9, a food policy expert, posits:

> *'I think the European-wide risk governance – risk assessment, risk management and risk communication – processes have been a success. I think it serves consumers well, and I think it has maintained independence from the retail sector, from the farming lobby and all the rest. So, I think EFSA and FSA have improved consumer confidence and trust in the system.'*[80]

S3, regulatory science and food policy expert, also added that:

> *'Well, certainly, both EFSA and FSA were created to try to enhance confidence in regulatory policy-making. Certainly, they have published evidence that shows that there is a reasonably high level of trust in both institutions…It is difficult to predict the*

[77] See chapter six
[78] See chapter six
[79] See chapter six
[80] S9, Interview, 25 Jan. 2021.

post-Brexit regime, because EFSA took over most of the roles for which FSA was created to do…'[81]

For the PPP and antibiotic regulatory regimes, there were mixed reactions from the stakeholders interviewed. Some stakeholders believe that the EU's global leadership in AMR governance enhanced the public trust and confidence in the regulatory regime. As TD, regulatory policy expert, expressed:

'For many years, it was not doing nearly as much as it should have been doing. Starting from the banning of the use of antibiotics as growth promoters in 2006. There were countries that had done it before the EU, but the EU led the world in that campaign…And the subsequent arrangements, such as the move to ban preventative mass medication, have certainly enhanced public confidence in the regimes.'[82]

Other stakeholders also criticised the EU's veterinary medicines approval and authorisation regimes for giving room for commercial interests and creating conflicts of interest. As C1 from the Alliance to Save Our Antibiotics (ASOA) argues:

'…the way EU/UK regulatory system is, was also problematic, especially the way in which veterinary medicines are put on the market…When a member state, under a centralised or decentralised method, assesses the dossier, they get paid…So the reality is the pharmaceutical industries choose the decentralised method much more often than the centralised method if they have a preferred regulator, they can choose it…And the regulator that is chosen most often in Europe is the UK's VMD…which creates a conflict of interest. Because if the UK, through the VMD, were to take a strong stand on certain things like saying you would not be able to use that antibiotic too much or putting a lot of restrictions because of AMR or certain things, then the

[81] S3, Interview, 16 Feb. 2021.
[82] S11, Interview, 21 Sep. 2020.

pharmaceutical companies would be more likely to choose another country to assess it.'[83]

Some experts and stakeholders also expressed concerns about the legitimacy and credibility of industry's research, data, and facilities used by the regulators. For instance, as noted above, the Environmental Audit Committee of the House of Commons raised concerns about DEFRA's decision to rely mainly on industry-funded research on the environmental impacts of neonicotinoids.[84] Other stakeholders also criticise industry for promoting 'biased science' and also hiding vital data from the public. As C1 argues:

'…the problem is allowing the pharmaceutical industries to partly control the regulatory system itself; it is obviously wrong…They have, from decade to decade, resisted change…And they have over the years produced a lot of incorrect "biased science" which has slowed down progress.'[85]

Professor Ian Boyd, the former Chief Scientific Adviser for DEFRA, added that restrictions on vital information and studies from the public contribute to public mistrust, credibility, and legitimacy concerns. He expressed that:

'…similar criticisms could be levelled at the regulatory studies used to support the licensing of neonicotinoids as pesticides. These studies were not open to scrutiny, and I was never given access to them. The drive to avoid multiple jeopardies and to protect commercial confidentiality does nothing to promote transparency and trust in the regulatory system…I suggest that the progressive increase in pesticide prohibition is symbolic of increasing distrust in current pesticide regulation. The rising tide of evidence, irrespective of its quality, also reflects this loss of trust.' (Boyd, 2018)

[83] C1, Interview, 10 Jun. 2020.
[84] *See* House of Common (2014). Environmental Audit Committee's (EAC) report on 'National Pollinator Strategy.' https://publications.parliament.uk/pa/cm201415/cmselect/cmenvaud/213/213.pdf. Accessed on 02 October 2021.
[85] C1, Interview, 10 Jun. 2020.

However, I1 from CPA contend that most of the relevant data the regulator needs are publicly available; only a small fraction is withheld from the public to safeguard commercial confidentiality. As he contends:

> *'Most of the data is publicly available…The only confidential information is when you do top studies, and the confidential part is where it is done and who conducted it …And there are commercial confidentialities around mixtures – what is in your product. So, for all the top studies, you can see the evidence, and anybody can see them from the EFSA's website or the applicants. But this keeps coming up, our members pay for the data to be generated, but these data packages cost hundreds of millions of pounds. And who is going to pay for it? These studies are independently audited. So just like a research facility, independent auditors see to it that they make everything correctly.'*[86]

G1 from FSA also refuted the claims that the industry forges evidence for their commercial interest. He posited:

> *'…I also believe that industries do not make up evidence; that is false. If they are found to make up evidence, the lawsuit will cost so much that the company will go bankrupt, so no company will risk doing that. Therefore, I don't think companies make up evidence; they might lobby. In that sense, it is the work of the risk assessor, FSA, DEFRA or VMD, to be robust. They should be able to specify what kind of evidence they need to be able to undertake risk decisions. The job of a regulator is just to be very clear about what information is required, and if they are lobbied, they will be able to defend why the information is required scientifically. Or maybe the lobby is appropriate.'*[87]

[86] I1, Interview, 03 Jun. 2020.
[87] G1, Interview, 14 Jun. 2020.

5.8.2 Post-Brexit Challenges and Opportunities

The analysis suggests that Brexit and the withdrawal from the EU's regulatory arrangements present both challenges and opportunities to enhance legitimacy, credibility, and trust in UK's agri-food regulatory regimes. Some of the experts interviewed expressed concerns about the perceived political interference in the activities of the scientific agencies, which might affect the level of public trust in scientific risk assessment and authorisation processes post-Brexit. They attributed the perceived interference to the organisational design and structure of agri-food regulatory regimes in the UK, that is, the lack of institutional separation between risk assessors and risk managers. For instance, in the food safety regulatory regime, FSA has internal risk assessors that deal with scientific analysis and a board that makes risk management decisions. In the veterinary medicines regime, the VMD, which is in charge of risk assessment and authorisation of veterinary medicines in the UK, also works directly under DEFRA as an executive agency. As S3, regulatory science and food policy expert, posits:

> *'…If we go back to the beginning, FSA's mandate was to advise and ministers decide…That was what it said on the white paper…But in practice, when the legislation was adopted, instead of FSA advising and ministers deciding, the FSA advised itself, and the FSA board became the policy-making body.'*[88]

They explained further that this arrangement had given rise to government and industry interference, creating conflicts of interest and eventually leading to regulatory capture. As S3 argue:

> *'It [FSA] was supposed to be independent of both the food industry and ministers. It is now independent of neither…Over the years, ministers and senior officials not only in the Food Standards Agency but in other departments have made it exactly clear that the FSA's room for manoeuvre and freedom to make its own autonomous judgments is very tightly constrained. Ministers have all kinds of ways of letting them know what*

[88] S3, Interview, 16 Feb. 2021.

kind of advice they want to receive…So, the Food Standards Agency has never been politically independent, and the little political independence it had has substantially been diminished. I would describe it now as the government's poodle.'[89]

S9 also added there had been frequent attempts to reduce FSA's rigorous approach to food safety and/or even dissolve the agency altogether in the future. According to him, this proposition will not be a popular political view and will eventually affect public confidence in the food safety regulatory regime. He posited:

'…my view is that we should maintain as much of the EU risk governance processes as we have had…But I think in the government's eyes, they are a sort of a drag on innovation... So even the future existence of the FSA, I think, is in doubt…And obviously, if you go back to the BSE crisis, there was a good reason why the FSA began…it began because the old Ministry of Agriculture, Fisheries and Food was seen to be too close to the food industry. So, it is not a popular political view now. But from my point of view, we want to maintain much of that [Pre-Brexit] risk assessment apparatus as we can. I think the FSA did a good job of science-based and evidence-based policy... But even pre-Brexit, there were moves, mainly because of the lack of resources for doing the kind of inspections and food safety regulations that might be ideal. There were moves towards a less rigorous approach to food safety…'[90]

Some of the stakeholders also expressed that Brexit presents an opportunity for the UK to re-structure the various regimes and retrieve them from 'regulatory capture'. As C1 from ASOA contend:

'Now with Brexit, the UK has left the EMA, so it is no longer part of this whole decentralisation system. I think it is an opportunity to start afresh. Now that the

[89] S3, Interview, 16 Feb. 2021.
[90] S9, Interview, 25 Jan. 2021.

pharmaceutical companies do not have options to choose which regulator to assess, the VMD can take a strong stand and rebuild the trust.'[91]

5.9 Scientific Uncertainties

The growing complexity in global agri-food systems has also increased the level of uncertainties in terms of cause-effect relationships on issues. Most of the issues in the sector, including pesticides and antibiotic use, involve multiple interacting or mutually interdependent elements, each one of which can lead to unknown or unintended consequences. EFSA (2018:1) defines uncertainty as 'all types of limitations in available knowledge that affect the range and probability of possible answers to an assessment question'. Uncertainties affect science-based or evidence-informed regulatory policymaking in two broad ways. First, it gives room for evidentiary bias – the tendency for some interest groups to produce evidence that is biased towards their preferred outcome (Boyd, 2018). It can also affect public trust and acceptance of scientific institutions, especially when decisions based on available knowledge lead to undesirable outcomes. Uncertainty management has therefore become crucial for the integration and use of evidence in regulatory policymaking.

Scientific uncertainties can be managed through research and communication. Robust scientific research can provide clarity and minimise the degree of uncertainty on certain regulatory problems. Also, effective communication of known and unknown effects, facts, or knowledge of the issue to risk managers and the public can enhance the public confidence in the evidence produced. As G1, a senior member of FSA, explains:

'…It is about being clear to the people. This is what we know; this is how certain we are about it; this is what we do not know; this is what we are doing to find more about it; this is when you should expect more information; this is how we will tell you once

[91] C1, Interview, 10 Jun. 2020.

we know; this is the decision we are making now based on the information available but if that information changes, we might change the decision. It is just having that open conversation about where you are….'[92]

5.9.1 Pre-Brexit Arrangements and Procedures for Uncertainty Management

The Philips Inquiry asserted that the failure of government departments and advisory groups to communicate the uncertainties surrounding the BSE contributed to the loss of public trust in the scientific advisory system in the UK. In the 2000s, EU/UK regulators adopted various measures to manage uncertainties in the regimes. The EFSA and FSA put in place measures to enhance transparency, openness and communication of risk and uncertainties to the public. Their strategy included making risk assessment and board meetings open to the public and publishing minutes of all meetings. They also use other mediums and formats such as scientific opinions, news stories and media engagements to communicate their scientific analysis, including the direction and magnitude of uncertainties. As G1 explains:

'The main thing we push on a lot is openness and transparency. Our meetings, whether risk assessment or board meetings, are open, so members of the public can come along. The minutes of all our meetings, unless confidential information, are also open. Additionally, many of our advisory committees and scientific board meetings are videoed and put on the website for the public to watch later... Every other thing that happens behind closed doors, how and why certain decisions are taken, are made available to the public...We also try to use other mediums and formats to reach out to different audiences….' [93]

The analysis showed that the EU adopted the precautionary principle as a management practice when the required evidence went to post-normal science – where the facts were

[92] G1, Interview, 24 Jun. 2020.
[93] G1, Interview, 24 Jun. 2020.

uncertain, stakes were high, values were in dispute, and decisions were urgent. This was the case with the neonicotinoids assessment and restrictions. In 2013, EFSA's scientific opinion suggested that neonicotinoids might pose a risk to bees.[94] However, the EFSA admitted that the available evidence was limited and therefore needed further research.[95] The EU started restricting the use of imidacloprid, clothianidin and thiamethoxam (neonicotinoid products)[96] on a precautionary basis. In 2018, drawing upon extensive studies, the EFSA confirmed that neonicotinoids pose a substantial risk to bees.[97] Based on the evidence, the EU banned the outdoor use of the three neonicotinoids.

5.9.2 Post-Brexit Challenges and Opportunities

The use of the precautionary principle in the pre-Brexit EU/UK regulatory regimes generated mixed reactions among stakeholders in the UK. The UK government has opposed the use of the precautionary principle in several regulatory issues.[98] Some of the stakeholders interviewed also opposed the frequent use of the precautionary principle by the EU in the pre-Brexit regime. They argue that it stifled innovation in the sector and, therefore, the UK should apply it better in the post-Brexit regimes. As I1 from the Crop Protection Association argues:

> *'…the precautionary principle is something EFSA employs a lot. If in doubt, they employ the precautionary principle, which goes quite against the UK's position of a weight of evidence; the UK is quite pragmatic in its approach. But for the future*

[94] EFSA (2013a). EFSA identifies risks to bees from neonicotinoids. https://www.efsa.europa.eu/en/press/news/130116 Accessed on 21 October 2021
[95] EFSA (2013b). EFSA assesses the potential link between two neonicotinoids and developmental neurotoxicity. *See* https://www.efsa.europa.eu/en/press/news/131217 Accessed on 21 October 2021
[96] European Commission (2013). Bee Health: EU takes additional measures on pesticides to better protect Europe's bees. Press release. *See* https://ec.europa.eu/commission/presscorner/detail/en/IP_13_708
[97] EFSA (2018). Neonicotinoids: risks to bees confirmed. *See* https://www.efsa.europa.eu/en/press/news/180228. Accessed on 21 October 2021.
[98] *See* chapters six and chapter seven.

perspective, when regulation 1107 is transposed into UK law, I think the UK will employ it better and implement it better.'[99]

I2 from the Agricultural Industries Confederation added that:

'I think the current system is clearly on the side of caution, and they take on the precautionary principle, which to me, has negative impacts on chemical companies and farmers trying to produce food…'[100]

However, other experts and stakeholders believe that the precautionary principle is the best approach to protect consumers and the environment in the presence of scientific uncertainties. As S3, regulatory science and food policy expert, argues:

'Historically, the judgement in food policy was that we would only ban something if it were proven to be harmful. So, you wait until you are absolutely certain before taking action. That was a political judgement. Of course, it was always misrepresented as if it was purely scientific…I mean, the reason why the EU adopted a precautionary principle…is because of the chaos created by the mad cow disease [vCJD]. There were many reasons, over the years, for doubting the safety of British beef from animals infected with BSE, but they did not impose adequate restrictions until it was for ten years until proof of harm emerged. So, the whole argument for precaution is don't wait until you get enough evidence. If there are good reasons for doubting the safety of a product, you restrict it on the side of caution until proven otherwise…. the neo-liberal free marketeers in the Conservative party say life is full of risk; let us not mollycoddle the people and let them make their own decisions…So, there is a lot of this anti-precautionary rhetoric, but I think it is a very dangerous policy approach.'[101]

[99] I1, Interview, 03 Jun. 2020.
[100] I2, Interview, 10 Jun. 2020.
[101] S3, Interview, 16 Feb. 2021.

Professor Ian Boyd, the former Chief Science Advisor of DEFRA, also added that the UK government's pragmatic approach – to be guided solely by the evidence – is bold and risky (Boyd, 2018). According to him, this approach opens up the door for evidential bias. He posited:

> *'…UK government ministers always said they would be guided by the science about neonicotinoids. This was a bold statement. There are several problems associated with making science the sole guide to policy, one of which is that it can encourage people with a particular agenda, either overtly expressed or subliminal, to produce research biased towards their preferred outcome….' (Boyd, 2018)*

5.10 Scientific and Policy Ambiguities

Ambiguity in regulatory policymaking has been defined by scholars as the type of uncertainty that arises from multiple representations of a system (Kovacic & Felice, 2019) or the existence of 'contradictory certainties' (Stirling, 2007), which could lead to different policy options. As regulatory regimes move from technocratic to open, pluralised, and co-dynamic governance models in liberal democratic environments, different stakeholders have the opportunity to argue and influence regulatory decisions to suit their interests. Especially in the moments when regulatory issues enter into the realms of post-normal science, interest groups may present contradictory evidence which suits their interests. These circumstances often bring in normative challenges and debates even among experts on the right procedures and standards (Wilsdon et al., 2015).

Additionally, regulatory decisions consider a myriad of factors, including social, economic, cultural, and political issues. Incorporating all these factors into the regulatory policymaking process makes the evidence-policy plane complex and messy (Gluckman, 2016; Gluckman & Wilsdon, 2016). As Gluckman (2016: 969) argues 'the notion of "evidence" comes in multiple forms. Public opinion polls and anecdotes are often considered "evidence" for a certain course

of action. Policy decisions involve balancing empirical data with other arguments…'. Therefore, enhancing the use of evidence in the post-Brexit agri-food regulatory regimes will entail addressing ambiguities. This section analyses the sources and causes of ambiguities in the selected cases in the pre-Brexit EU/EU regulatory regimes and the opportunities and challenges that exist in the post-Brexit regimes to address them.

5.10.1 Pre-Brexit Ambiguity Challenges

One of the major issues raised by the stakeholders interviewed concerning the pre-Brexit regulatory process and risk management was the 'politicisation of evidence'. They described the EU/UK risk management process to have followed public opinions more than the available scientific evidence. For instance, in the case of the pesticide authorisation regime, I2 from the Agricultural Industries Confederation (AIC) argued:

> *'…I think it [the EU's risk management process] has become politicised over the last few years. And that is not helpful because, ideally, we would want a scientific process that looks at the evidence by peer-reviewed science to arrive at a decision on whether a product should be approved or not or what mitigation strategies may be necessary. What we found out is that it is been more influenced by public opinion. A very good example is the issue around neonicotinoid insecticides. There was a lot of public lobbying about that because the message the public got was that they were harmful to bees… But I think the public really got hold of that message without really understanding how they are used, why they are used, how the problem arose and how it could be addressed…so that is what the issue is; politicisation.'*[102]

I1 from Crop Protection Association also added that:

[102] I2, Interview, 10 Jun. 2020

'It [the neonicotinoid ban] was massively politicised. And even if you came with data that suggest that it did not harm bees through the pollen, it would not have been accepted at the EU level and would have been voted to be banned. And this is what happens at the EU level; it is a different structure - the EU parliament has a lot of Greens… and I think we need to embrace and align with the neutrality of science to base our decisions. But unfortunately… the neonic was massively a decision based on politics…And we did not agree with that as an association. Our companies submitted all their data a lot of these neonics have passed the risk assessments, but they were still banned.'[103]

However, some experts contend that in a democratic environment, you cannot take politics out of regulatory decision-making. As S3 argues:

'My view is all regulatory decision-making is political; whatever scientific evidence is available, science can tell you what is known and not known, but it cannot decide policy. Policy decisions always are political decisions and always have been.'[104]

G1 from FSA also added:

'…a lot of people would argue that it has been very political in Brussels in the past. Neonicotinoids and gene editing are, perhaps, the classic example in which science has not been followed, and politics have interfered with the decision. And the big challenge for the UK…is that, like neonicotinoids, the science might tell you one thing, but there are a whole lot of other issues which need to be considered in the decision-making process. Some are economic and cultural, and others are purely political.' [105]

[103] I1, Interview, 03 Jun. 2020.
[104] S3, Interview, 16 Feb. 2021.
[105] G1, Interview, 14 Jun. 2020.

G1 added further that, contrary to the general perception that it is only the private sector or the industry that lobbies, all the actors, including NGOs and academics, also lobby the regulatory process. He posited that:

> *'…I do agree that all stakeholder groups try to lobby the process sometimes. I know some scientists, not industry, are lobbying for genetic engineering to reduce half the testing that currently exists. These are academics, not companies, so it is not just the private sector. The NGOs may probably think it is always the industry, like Monsanto, but what they don't realise is that some of the biggest voices at the moment are from the public research institutions. Industries lobby because it is expensive to collect the information they produce; the NGOs also lobby to say they want more stringency; academics and researchers also lobby to say we want no long tests... So, everybody lobbies….'*[106]

The analysis showed that one of the major sources of ambiguities in the pre-Brexit regulatory regimes was the framing of the policy problem or the regulatory issue. There were concerns about populist campaigns in all the cases studied, where some actors mistakenly or intentionally diverted from the main regulatory issues to win public support for a particular policy goal. As G1 illustrated:

> *'In the case of antimicrobial resistance…many members of the public were confused about what the issue was. There was a big push effectively focusing on antibiotic residues in food and labelling to contain antibiotics. But that was the wrong issue. The issue around antimicrobial resistance is not about consuming some food with a very small amount of antibiotics in it, which leads to resistance of bacteria in your gut. Food could have a huge amount of antibiotics poured into it, and as long as you stopped pouring it in four or five days before you sell it, you wouldn't find any antibiotics…it had nothing to do with antibiotic residues, and yet the majority of the public was talking*

[106] G1, Interview, 14 Jun. 2020.

about that…The same with the pesticide issue, the majority of issues around new neonicotinoids are not about residues and harming human health but about biodiversity. Yet, a large section of the public was campaigning based on public health.'[107]

5.10.2 Post-Brexit Challenges and Opportunities

Some of the stakeholders indicated that Brexit would help to reduce EU bureaucracy, ambiguity, and politicisation because the number of actors in the decision-making process will reduce. However, the UK risks losing access to different and varied opinions from EU experts and actors, which often enriches regulatory decisions, especially on opinions on new approaches, products, and methods. As DM contends:

'…It [Brexit] will remove some of the bureaucratic processes. One of the complexities of the regulations as it stands now is you must go out for comment for an active substance with other member states, but when you are on your own, you don't have friends to ask for comments; so that should reduce the time scale…sometimes, the collaborations in the EU helps when you are testing new models, new risk assessment approaches, having experts with different opinions really helps. But sometimes, it becomes so complicated with so many actors.'

5.11 Chapter Summary, Conclusion and Recommendations

The main objective of this chapter was to analyse the post-Brexit challenges and opportunities for evidence-informed agri-food regulatory decision-making in the UK. The chapter was divided into two main parts. The first part assessed the institutional capacity of UK scientific agencies – in terms of their R&D funding, expertise, and opportunities for collaboration – to

[107] G1, Interview, 14 Jun. 2020.

produce credible evidence to ensure sustainability in the post-Brexit agri-food sector in the UK. The second part of the chapter analysed the post-Brexit challenges and opportunities to enhance the integration of evidence in agri-food regulatory decision-making in the UK.

The first part confirmed that there was a massive decline in the capacities of UK's domestic institutions in charge of agri-food regulatory governance in terms of research funding and staff strength (the number of expertise) in the decade before Brexit. As summarised on Table 5.1 below, the analysis showed that the R&D spending for all the major departments in charge of agri-food regulatory governance in the UK declined significantly in the decade before Brexit. The UK benefited significantly from EU research funding programmes and the direct grants from EU agencies, such as EFSA. Also, the EU's research network and intelligent databases such as RASFF also served as a tool for knowledge sharing and the exchange of vital scientific information.

The analysis showed that the UK government has taken considerable measures to address the pre-Brexit decline in domestic capacities and the emerging issues after Brexit. As summarised on Table 5.1 below, there has been a substantial increase in R&D funding, and the number of staff and experts across all the major departments in charge of agri-food governance in the UK. The UK government has also developed alternative measures, including the so-called 'Plan B' domestic research funding plans, and arrangements with other international networks, such as INFOSAN, to replace EU networks and intelligent sharing databases.

The chapter revealed that there might still be some shortfalls for the post-Brexit regimes. In terms of funding, the analysis called for clarity on how the proposed R&D funding will cover different sectors and how it could be sustained in the longer term. There are also concerns about the inexperience of new staff in the various departments in dealing with the immediate post-Brexit challenges in the agri-food sector. The chapter shows that the major challenge for domestic scientific institutions will be internal and external coordination. Internally, because Northern Ireland operates under EU regulatory regimes, there might be different procedures

and principles of risk analysis if the UK diverges. Also, because agri-food policies are devolved, there will be coordination challenges if different administrations take different regulatory policy paths. The analysis also shows concerns on the ability of voluntary networks such as INFOSAN to effectively deliver the same service as the EU's RASFF, which could potentially lead to gaps in data for the UK's risk assessment and the ability to detect new threats along the agri-food value chains. The chapter recommends an intensification of on-the job training for new staff at junior levels to enhance their capacities to effectively address the emerging challenges in the sector. The chapter also calls for strategic investment in the UK's internal networks and intelligence systems to address the potential shortfalls in data and food safety alerts.

The second part of the chapter revealed that Brexit presents both challenges and opportunities to enhance the integration and use of scientific evidence in regulatory decisions. As summarised in Table 5.1, the EU and the UK adopted measures in the post-2000 reforms period to enhance legitimacy, credibility, and trust in the agri-food regulatory regimes. The EU has in place institutional and functional separation of risk assessment and management practices to ensure the independence of scientific institutions. It also includes strategies to improve openness and transparency to enhance trust and credibility in the risk assessment processes.

However, the analysis revealed legitimacy and credibility concerns on the industry's ability to choose their preferred regulators in assessing their products within the EU's decentralised approval regimes for veterinary medicines and pesticides. The analysis further showed that there were many concerns on the 'politicisation' of evidence and risk management processes. It also revealed that there were a lot of misconceptions and misconstruction of policy problems and regulatory issues, which affected the integration of evidence and public acceptance of policy solutions. The chapter also revealed that there were mixed reactions concerning the use of the precautionary principle as uncertainty management practice, with some stakeholders calling for it to be minimised in the post-Brexit regimes whereas others call for it

to be expanded. The chapter recommends an enhancement in science communication strategies to improve public understanding of regulatory issues and counter the spread of fake information in the public space. The chapter also recommends the enhancement of public participation in the risk assessment processes to improve transparency, trust, and public understanding of regulatory issues.

Table 5.1: Challenges and Opportunities for Evidence Production and Integration

	Pre-Brexit Arrangements/Issues	Post-Brexit Arrangements, Opportunities and Challenges	Recommendations for Policy and Practice
Funding	● Massive decline in domestic R&D spending for all the major departments in charge of agri-food regulatory governance (FSA, DEFRA, HSE). ● UK's agencies depended partly on private charges and industry research. ● UK's agencies were major beneficiaries of EFSA grants. ● The UK was mostly a net receiver of EU research funding.	● A substantial increase in the overall UK's R&D funding. ● Negotiations to be part of EU's research framework programme, Horizon Europe (Ongoing). ● 'Plan B' domestic research funding arrangement as an alternative to Horizon Europe.	● The need for a clear long-term sector-specific R&D funding strategy. ● A binding commitment from all Parties to maintain the long-term R&D funding pledge.
Expertise	● A substantial decrease in the staff strength of all the major departments in charge of agri-food regulatory governance.	● Massive increase in the number of staff and experts across all the major departments in charge of agri-food regulatory governance ● Most of the new staff are hired at the junior level; therefore, there is the possibility of supervision problems.	● The need to intensify on-the-job training and development programmes for junior staff.
Coordination and collaboration	● UK's domestic institutions were connected by EFSA's network, such as RASFF. ● The RASFF served as a vital tool for receiving food and feed safety alerts in the UK. ● EU's research networks connected UK researchers to researchers and scientific	● The UK is no longer part of the EU's network and intelligent sharing databases, such as RASFF and EARS-Net. ● The UK has turned to other international networks such as INFOSAN, GLASS and CAESAR as an alternative source of intelligent data sharing.	● Alternative arrangements for international research collaboration – bilateral and multilateral research agreements. ● The need for more investment (funding) in the UK's internal networks and intelligent systems.

	facilities in other EU member states, enhancing information sharing and knowledge exchange.		
Legitimacy, Credibility and Trust	● Institutional and functional separation of risk assessment and risk management practices at the EU level to ensure the independence of scientific institutions. ● General enhancement in openness and transparency of risk assessment procedures at the EU and UK levels. ● Legitimacy and credibility concerns among some stakeholders on industry's research. ● Legitimacy and credibility concern on industry's ability to choose their preferred regulators in the EU's decentralised authorisation regime.	● Concerns about the lack of institutional separation between risk assessment and management in the UK's agri-food risk governance arrangement. ● Concerns on the perceived government and private interference in risk assessment processes.	● Institutional separation of Risk Assessment and Risk management functions. ● The need to enhance public participation in risk governance processes
Uncertainty	● Enhancement in openness, transparency, and risk communication strategies ● Adoption of the precautionary principle as an uncertainty management instrument.	● Concerns about the future use of the precautionary principle in post-Brexit agri-food regulatory regimes in the UK.	● Enhancement in openness, transparency, and risk communication strategies.
Ambiguities	● Misconstruction of policy problems and regulatory issues. ● Politicisation of evidence and risk management processes.	● Disconnection from the EU's arrangement will lead to a reduction in the number of policy actors and possibly reduce the level of bureaucracies, politicisation, and ambiguities in the regulatory regimes.	● Enhancement in science communication strategies.

Source: Developed by the Author

CHAPTER SIX: THE EVOLUTION OF UK'S AGRI-FOOD REGULATORY REGIMES

6.1 Introduction

The primary purpose of this chapter is to address the third objective of the thesis and the associated research questions – which is to trace and analyse the impact of EU membership on the UK's agri-food advisory and regulatory structures. The chapter provides empirical findings on how regulatory landscapes of the selected regimes – food safety, animal health and welfare, and plant protection products – have evolved in the UK since the Single European Act (SEA) in 1986. It discusses the trend, pattern, and degree of Europeanisation in each regime. Following the analytical framework developed in section 4.7, the findings of this chapter will form the basis of analysis for the next chapter.

The chapter is arranged as follows. After this introductory section, the remaining sections are organised into three main parts (Part I to III) and a summary and conclusion section. Each part is dedicated to analysing one of the selected regimes: food safety, animal health and welfare, and plant protection products. They all begin with a historical analysis of the regime, including how the discourse on regulations started, and the key events that triggered reforms and critical junctures. The second section of each part presents the findings and discussions of how EU membership affected institutional arrangements, public discourse, norms, standards, and policies of each regime. Finally, the chapter summary and conclusion section compares and contrasts the dynamics of Europeanisation in each case and their overall impacts on advisory and regulatory systems for agri-food governance in the UK.

Part I: THE FOOD SAFETY REGIME

'The public has the right to expect the very highest standards of food safety. Confidence in the safety of the food we eat has been severely undermined in recent years, and I am determined to rebuild that trust…We need to create a structure that is open and transparent and… is seen to act – in the interests of consumers'. – Tony Blair, UK Prime Minister (1997-2007)[108]

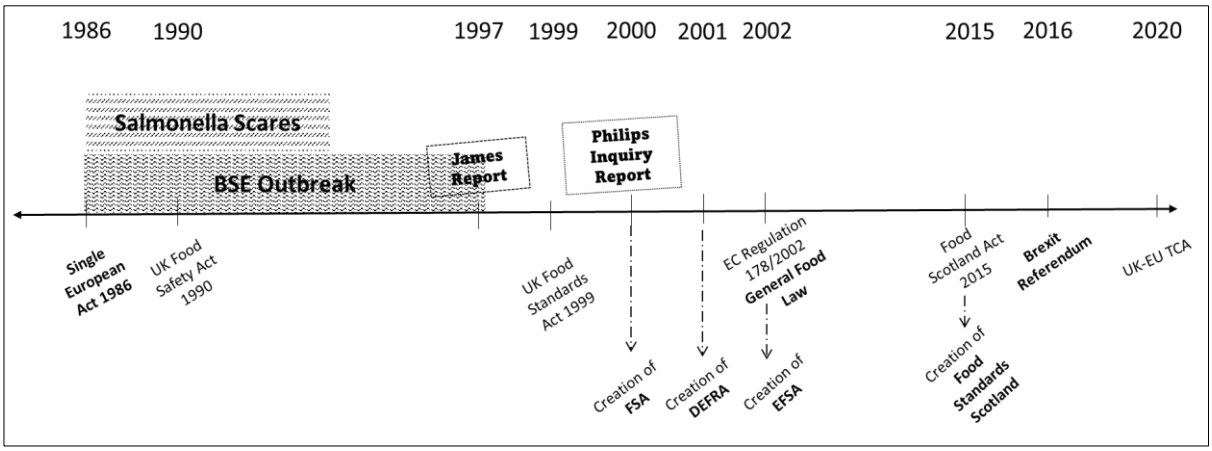
'Community and Member State food safety systems have been under unprecedented pressure during recent feed and food emergencies. These emergencies have exposed weaknesses which call for action by the responsible authorities… to re-enforce, improve, and further develop existing systems. Food safety needs to be organised in a more coordinated and integrated way. This will allow existing weaknesses to be addressed, whilst at the same time creating a genuinely world-leading food safety framework, which can deliver a high level of public health and consumer protection…' – The European Commission[109]

6.2 Evolution of UK's Food Safety Regulatory Regime

This section explores how the food safety regulatory regime in the UK has evolved over the past three decades – from 1986, when the Single European Act was adopted, to 2016, when the Brexit Referendum was held. The analysis is divided into two main periods with reference to major adjustments made to the regime: the pre-reform period (pre-2000s); and the post-reform period (post-2000s). The section analyses domestic institutional arrangements and legislation on food safety governance before the year 2000 and the changes in the regulatory setup after the reforms. It also emphasises food safety issues and crises as the source and origin of domestic reforms for regulatory governance in the UK. It finally reviews how the EU's regulatory activities expanded within the regime and their overall impacts on domestic institutional arrangements for food safety governance in the UK.

[108] *See* The Guardian (09 May 1997). Blair promises to restore food 'trust' with standards agency.
[109] European Commission (2000: 7). White Paper on Food Safety.

Fig 6.1: Diagrammatic overview of crucial events in the UK's food safety regime



Source: Developed by the Author

6.2.1 The Institutional Arrangements for Food Safety Governance in the UK before 2000

At the beginning of 1986, the UK's legislative framework for food safety governance was based on the Food Act 1984. This Act consolidated all the previous agri-food regulations into one piece of legislation. In 1990, the Food Safety Act (1990) was passed to make a new provision in place of the Food Act 1984. A vital feature of the new Act was its emphasis on food safety, as it states: 'any food which fails to comply with food safety requirements shall be guilty of an offence' (ibid: page 9). In addition, the Act placed the responsibility for designing and implementing food safety policies in the hands of two main government departments: the Ministry of Agriculture, Fisheries and Food (MAFF) and the Department of Health (DoH). There was no separation between risk assessment and management within this regulatory setup. The government departments responsible for managing food safety risks also had internal scientific advisory groups providing scientific advice on food safety issues. However, these advisory groups did not have a legal or statutory base but operated under the direct discretion of the Minister in charge. Ministers could abolish or create a new committee anytime they deemed relevant. (Millstone & Zwanenberg, 2002)

6.2.2 Food Safety Scares and Crises in the late-1980s and the 1990s

A series of food safety scares and crises that befell the UK's agri-food industry in the 1980s and the 1990s brought the advisory and regulatory regime into disrepute and eventually resulted in demands for reforms. The first wave was the 'salmonella scare', which occurred between the late 1980s and early 1990s. The salmonella crisis began when the then-junior Minister of State at the Department of Health (DoH), Edwina Currie, declared on a national television that 'most of the egg production of this country [UK], sadly, is now infected with salmonella'. (Doig, 1989)

The Minister's pronouncement put the entire UK poultry industry and its regulatory arrangement in a chaotic state. The National Farmers Union (NFU), the British Poultry Federation, and the British Egg Industry Council condemned the statement for its damaging impacts. They contended that the Department of Health (DoH) was erroneous to have issued such advice – which was not easy for the public to interpret in practice. The NFU stressed that it had cooperated with MAFF in drawing up codes of practice for the egg industry, so it was hasty for the DoH to have issued that caution (Doig, 1989). Moreover, media speculation and reports suggested that MAFF and DoH knew the seriousness of salmonella but were more concerned about the interest of the egg and poultry industry.[110] MAFF was, thus, criticised for siding with the industry to the detriment of consumer protection and public health.[111]

Around the same period as the salmonella crises, a new neurodegenerative cattle disease, bovine spongiform encephalopathy (BSE), popularly referred to as the 'mad cow disease', emerged. The disease was identified in November 1986 to have originated from feeding with meat and bone meal (MBM) – a protein meal made from animal carcasses. MAFF disregarded initial public concerns about the risk of transmissibility to humans.[112] Government officials kept

[110] First Report, Agriculture Committee, HMSO, 1988-89, HCP 108-11, Vol. 2, Minutes of Evidence and Appendices.
[111] First Report, Agriculture Committee, HMSO, 1988-89, HCP 108-11, Vol. 2, Minutes of Evidence and Appendices.
[112] The Guardian (02 Oct. 1993). Mad cow figures 'massaged by back-dating dates of deaths'. *The Guardian (1959-2003)*

reassuring the public that there was insufficient evidence to conclude that the two diseases were related (Seguin, 2000). However, the government's assurance was undermined as the number of cases kept rising[113] and the possibilities of transmissibility to humans began to appear in medical journals and public domains (Seguin, 2000). Finally, in March 1996, the CJD Surveillance Unit confirmed that it had identified a new variant of CJD (vCJD), which they concluded had a possible link to BSE. On the 20th of March 1996, the government finally announced the possibility of transmissibility of BSE to humans.[114] This series of events eroded public trust and confidence and the overall credibility of the UK's food safety regulatory regimes.

6.2.3 James Report (1997) and the establishment of the Food Standards Agency (FSA)

Before the 1997 UK general elections, the opposition Labour Party turned the food safety crisis into a campaigning issue to restore public confidence in the food safety regulatory regime. They promised to build a new structure, the 'Food Standards Agency', to control food safety in the country. The party called on Professor Philip James to design a blueprint for the proposed structure after winning the election. An interim proposal – highlighting the basis of the food safety crises and the processes needed to establish the Agency – was presented to the Prime Minister, Tony Blair, in May 1997.

James' report affirmed that the public had lost confidence in UK regulators and the safety of British food due to inappropriate political and industrial interests. Professor James expressed that '…the fundamental aim should be to re-establish public confidence in the national mechanisms for handling problems concerning food.'[115] Therefore, he proposed that the new Agency should 'be established as a Non-Departmental Public Body (NDPB)[116] with Executive

[113]The Guardian (13 Feb. 1992). *BSE deaths rising among young cattle* 1992.
[114] UK Parliament (1996). BSE (Health). Hansard. Volume 274: debated on Wednesday 20 March 1996.
[115]See The James Report. Page 3
[116] NDPB is a body that has a role in the national government process, but it is not a government department.

Powers' and 'should have more consumer and other public interest involvement within its structure. In addition, he recommended that:

> *'…the Agency should have a remit to assure public health in all matters of national food policy, including the microbiological, chemical, and nutritional aspects of food, and novel food and processes, such as genetic modification…The role of the Agency will include developing policy, proposing, and drafting legislation…It should have powers of access for auditing, surveillance, and enforcement "from the plough to the plate"…."*[117]

Following the recommendations of James' report, the UK parliament passed the Food Standards Act (1999) to establish the Food Standards Agency (FSA) and to amend the Food Safety Act (1990). The Act specified that the new Agency was to serve as an independent non-ministerial government department responsible for consumer protection and public health aspects of food policy.[118] The Agency was mandated to operate at 'arm's length' from the Government and cooperate with other departments, public authorities, and advisory committees at the subnational levels in the development of food policies. This organisational structure provided a functional separation between risk assessment and management. Here, scientific committees were given statutory authority to be in charge of risk assessment. At the same time, the Agency and other relevant departments were mandated to make risk communication and management decisions. In addition, the Act gave the Agency the mandate to publish all advice it gives to Ministers and other parts of government subject only to data protection requirements.[119]

The FSA, at its inception, outlined three core values: consumer first, accessibility and openness, and independence – to guide its activities.[120] This roadmap represented a shift from

[117] *See* The James Report. Executive Summary. Section 6.
[118] *See* the Food Standards Act 1999 Section 1, Clause 2.
[119] *See* the Food Standards Act 1999 Section 19
[120] *See* FSA (2005). FSA Strategic Plan 2005-2010: putting consumers first

the *status quo ante* and an attempt to address the principal shortcomings of MAFF's risk assessment and governance procedures. Also, given that food safety and standards are devolved, the Agency established offices in Aberdeen, Belfast, and Cardiff to ensure consumer concerns in each devolved administration (Scotland, Northern Ireland, and Wales) were well-addressed. In June 2001, the Department of Environment, Food, and Rural Affairs (DEFRA) was also created to take over some of the risk management and regulatory responsibilities – after the dissolution of MAFF.[121]

In 2010, the decision of the UK government to transfer the responsibility for nutrition and food labelling and standards from the FSA to DEFRA necessitated the Scottish Government to call for an independent food safety body in Scotland. In 2011, a committee led by Professor Jim Scudamore was commissioned to assess the feasibility of establishing a stand-alone Scottish Food Standards Agency.[122] Following the recommendations of the Scudamore's committee, the Food Standards Scotland (FSS) was established in 2015 to take over the responsibilities of the Food Safety Agency (FSA) in Scotland.[123]

6.2.4 Philips Inquiry Report (2000)

In 1998, the new Labour government set up an inquiry, chaired by Lord Phillips of Worth Matravers, to establish and review the history of the emergence and identification of BSE and vCJD and actions taken by government departments up to the 20th of March 1996. The Inquiry found several shortcomings in the scientific advisory and regulatory mechanism, especially concerning institutional coordination and the communication of risk and uncertainties to the public.

[121] MAFF was formally dissolved in 2002 when the MAFF (Dissolution) Order 2002 (SI 2002/794) came into force.
[122] See Scudamore Report (2012). Future arrangements to secure food standards and safety in Scotland
[123] See Food (Scotland) Act 2015 http://www.legislation.gov.uk/asp/2015/1/pdfs/asp_20150001_en.pdf

The report indicated that 'budget cuts' in certain critical units within MAFF affected its proactiveness in dealing with the outbreak. The challenge was attributed to the changes in the government's Research and Development (R&D) funding policies in the 1970s and 1980s (ibid: 158) and the decision of the Minister to cut expenditure on animal health research. The principal objective of the policy was to move public funds away from 'near-market R&D'[124] support. The decision affected the overall R&D funding of most government departments, especially departments like MAFF, which were primarily involved with commercially viable research. As John Gummer, the then Minister for agriculture, fisheries, and food told the Inquiry:

> *'Historically, MAFF had been a department that represented the interests of the agricultural producer, and for that reason, it was accustomed to doing a good deal of research that was focused on the interests of the producer'.*[125]

Dr David Shannon, MAFF Chief Scientist, explained that the policy change resulted in a reduction of about £30 million in the department's R&D budget.[126] Consequently, MAFF spread the cut across various units within the department. In particular, the Minister ordered that expenditure on animal diseases research was disproportionate and should be reduced. According to Professors Peter Biggs and John Bourne, the first two Directors of the Institute for Animal Health (IAH), the cut in funding for animal diseases research led to a 40% decrease in the number of science group staff in the IAH between 1983 and 1987.[127]

The report also pointed out shortcomings in information dissemination among relevant bodies at the early stage of the crisis. First, considering that BSE was a novel disease, the best practice would have been to publish information – about the disease's discovery, nature, and symptoms – to relevant bodies such as private veterinarians, farmers, and the media once as

[124] 'Near-market research' was R&D aimed at developing a marketable product or process. See White Paper DTI – the department for Enterprise (1988).
[125] See Philips Inquiry (2000). page 158
[126] See Philips Inquiry (2000). Page 159
[127] See Philips Inquiry (2000). Page 159

soon as the disease was identified. However, the Inquiry indicated that MAFF repeatedly restricted or delayed the release of information about the disease to relevant professional groups, including university researchers, in the early years of the outbreak. As detailed in the report:

> *'…up to July 1987 there was a policy of restricting, even within the State Veterinary Service, the dissemination of any information about the new disease. During the month of July, wider dissemination was permitted at specialist meetings, but an embargo was maintained on any general publication which drew attention to the similarities between BSE and scrapie'.*[128]

The report further pointed out that there was not enough intra and interdepartmental coordination among government departments and units in most parts of the crises. For instance, at the time of the outbreak, most of the leading experts in scrapie research were said to have been at the Neuropathogenesis Unit (NPU). However, the NPU was not invited to collaborate on further research until June 1987. Also, it was established during the Inquiry that MAFF officials had become concerned about the possible transmissibility of BSE to humans as early as 1987. However, until March 1988, MAFF had neither informed nor invited the Department of Health (DoH) to consider the implications of the BSE on human health. Thus, there was virtually no interdepartmental discussion between the two central departments (MAFF and MoH) until the middle of March 1996, when the link between BSE and vCJD was finally announced.[129]

The Inquiry also identified shortcomings in how uncertainties and risks about BSE were communicated to the public. For example, the public was reassured that 'beef was safe to eat' and 'BSE was not transmissible' to humans. However, these pronouncements failed to explain that the views expressed were subject to uncertainty and observance of precautionary

[128] See Philips Inquiry (2000). Page 46
[129] See Philips Inquiry (2000). Page XXIX

measures. Defending MAFF's communication strategy, Mr Brian Dickinson, who was a member of MAFF's Food Safety Group, told the Inquiry that:

> *'You could not just stand upright and give a totally impartial, objective view of what was the situation. There was a stronger danger of being misinterpreted one way rather than the other, and we tended to make more reassuring sounding statements than might ideally have been said'.*[130]

The Inquiry suggested that openness to the public is the best way to end doubts, suspicions, and mistrust in regulatory bodies and decisions. They stated:

> *'…our experience over this lengthy Inquiry has led us to the firm conclusion that a policy of openness is the correct approach…If doubts are openly expressed and publicly explored, the public is capable of responding rationally and are more likely to accept reassurance and advice if and when it comes.'*[131]

6.2.5 The Expansion of EU Regulatory Activities in the Agri-food Sector

Until the 2000s, the design and implementation of food safety regulations and standard-setting in the EU were done mainly at the national level. Article 36 of the Treaty of Rome[132] gave member states the mandate to restrict or prohibit imports on 'grounds of public morality, public policy or public security, the protection of health and life of humans, animals or plants…'. The EU regulatory framework and policy goals were delivered mainly through directives to strike appropriate balances between national food standards and the efficiency of internal trade. However, such differences in regulatory standards served as artificial trade barriers impeding the free movement of goods among member states. The adoption of the Single European Act

[130] See Philips Inquiry (2000). Page 265
[131] See Philips Inquiry (2000). Pages 265-266
[132] The Treaty of Rome is the treaty that officially established the European Economic Community (EEC), now the European Union. See https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=LEGISSUM:xy0023

(SEA) in 1986 provided reasonable grounds to harmonise regulatory standards to facilitate the development of a single market. According to Article 8A of the SEA:

> *'The Community shall adopt measures with the aim of progressively establishing the internal market over a period expiring on the 31st of December 1992… The internal market shall comprise an area without internal frontiers in which the free movement of goods, persons, services, and capital is ensured in accordance with the provisions of this Treaty.'*[133]

The BSE crisis and other food safety scare in the 1990s such as the swine fever epidemic in the Netherlands (Elber et al., 1999) and the dioxin crisis in Belgium (Covaci et al., 2007), and their spatial spread furthered the impression that nationalised systems of food safety governance were not adequate for the smooth operation of the single market. Key stakeholders, including consumer groups, farmers, and the food industry, called for a centralised body within the EU to facilitate trade and enhance the capacity for the governance of the food safety risks looming from the integrated market. These calls became momentous in the late 1990s as France and Germany refused to lift the ban on importing British beef (due to BSE scares) even after the European Commission (EC) declared they were safe to eat.[134]

In January 2000, the EC published the White Paper on Food Safety to reorganise the EU's food safety regulatory regime. The document drew on the lessons and experiences from the successive crises to propose measures to rebuild public confidence in the EU's agri-food system. Among the key proposals of the paper was the establishment of an independent European Food Authority that was mandated to provide scientific advice on food safety issues to the EC and other regulatory bodies within the EU. It envisaged an Authority that dwells on 'the highest standards of independence, excellence and transparency'[135] to help restore and

[133] See Article 8A of the Single European Act (SEA)

[134] Washington Post (12 Sep. 1999). *EU Officials Threaten to Sue France Over Beef: French Keep Ban on British Imports*, Washington, D.C. Washington Post.

[135] European Commission (2000). White Paper on Food Safety. Page 9

maintain consumer confidence. The white paper also proposed a wide-ranging legislative reform covering all aspects of the agri-food chain from 'farm to fork'.[136]

In January 2002, following the white paper, the EC and the European Parliament passed the General Food Law (Regulation (EC) No. 178/2002). This legislation laid down principles and procedures for matters directly or indirectly impacting food and feed safety and the legal basis for establishing the European Food Safety Authority (EFSA). The legislation identified that unevenness in applying different standards – notably, the use of the precautionary principle[137] - was leading to unequal conditions of competition and impeding the free movement of food within the Single Market. The Regulation, thus, provided a legal basis to approximate and harmonise regulatory standards within the Community. It expressed that:

> *'The precautionary principle has been invoked to ensure health protection in the Community, thereby giving rise to barriers to the free movement of food or feed. Therefore, it is necessary to adopt a uniform basis throughout the Community for the use of this principle'.*[138]

In this regard, EFSA was mandated to serve as 'an independent scientific point of reference' (ibid: 5) – to conduct a risk assessment and give opinions, especially on contentious issues, to address fragmentations of opinions on food safety issues within the EU. The Authority was also charged to serve as a hub to foster cooperation, information sharing, exchange of expertise and best practice among member states. It was further mandated to monitor all forms of risks that might emerge from any part of the food system through the Rapid Alert System for Food and Feed (RASFF).[139]

[136] European Commission (2000). White Paper on Food Safety. Pages 37-52

[137] The precautionary principle is a general principle that requires competent authorities to take preventative decisions or measures to ensure a higher level of human, animal or environmental protection in the case of risk or uncertainties. See Article 191 of the Treaty on the Functioning of the European Union (EU)

[138] European Commission (2002). General Food Law (Regulation (EC) No. 178/2002). Page 4

[139] RASFF is an intelligent system for reporting food safety issues within the EU.

To renew consumers' and stakeholders' confidence in regulatory institutions and decision-making processes, the EFSA was obliged to operate under the principle of independence, openness, transparency, and confidentiality. Accordingly, members of management boards, advisory forums, scientific committees, and panels were required to declare any interests which could be considered prejudicial to their independence or raise conflict of interest issues. The Authority was also supposed to make public without delay the agendas, minutes, opinions, annual reports, and declaration of interests of scientific committees and panels.[140]

The legislation also established institutional and functional separation between risk assessment and management. EFSA's duty, within this institutional framing, was purely that of a risk assessor, while the EC and member states were to serve as risk managers. This arrangement follows the EU Council's guideline on risk governance, which states that 'experts responsible for scientific risk assessment should be kept functionally separate from those responsible for risk management.'[141] The European Commissioner for Health and Consumer Protection at the time, David Byrne, asserted that the independence of EFSA would ensure that scientific risk assessment work is not swayed by policy or other external policy considerations.[142] However, to ensure coherence in the risk governance processes, EFSA was charged to:

> *'…act in close collaboration with the Commission and the Member States to promote the necessary coherence in the risk communication process… [and to] ensure appropriate cooperation with the competent bodies in the Member States and other interested parties with regard to public information campaigns.'*[143]

[140] European Commission (2002: 3). The General Food Law.
[141] See EU Council (2000: 4). The Council's guideline on risk governance.
[142] The Guardian (12 Jan. 2002). Byrne wants EU food laws tighter.
[143] See Article 40 of the General Food Law

6.3 Findings and Discussions: Europeanisation of UK's Food Safety regulatory regimes

Section 6.2 details the parallel run of events in the evolution of food safety regulatory regimes in the UK and the EU. This section integrates and discusses the outcome of the reforms on domestic structures, policies, and processes for food safety governance in the UK. Specifically, it puts the EU's expansion or harmonisation process alongside the UK's internal reforms to analyse the 'misfits' or a 'divergent outlook', the adaptational pressure, and the eventual domestic impact.

6.3.1 Polities

The first noticeable development in the post-reform food safety regime is the emergence of a multilevel regulatory polity. This denotes the spread or delegation of regulatory functions or authorities across multiple layers of government – from the national, subnational (devolved nations), the supranational (EU) and the global level. For example, the World Trade Organisation (WTO) adopted *Codex Alimentarius'* food standards as the minimum standards and reference point for disputes at the global level. Given that the standard-setting procedures of Codex consist of negotiations between member states, EFSA (after its establishment) was charged with leading the EU to participate in Codex meetings.[144] At the devolved level, the Food Standards Act (1999) expressed that:

> *'…there shall be established an advisory committee for Wales, an advisory committee for Scotland and an advisory committee for Northern Ireland for the purpose of giving advice or information to the Agency [FSA] about matters connected with its functions.'*[145]

This legislative requirement led to the formation of food standards offices in all the devolved nations. The separation of Food Standards Scotland (FSS) from FSA finalised the subnational

[144] See European Commission 2002. The General Food Law. Page 12

[145] See The Food Standards Act 1999. Section 5

tier of the regulatory regime. The Food (Scotland) Act 2015 gave FSS the mandate to develop and assist Scottish Ministers and public bodies to develop food policies, promote best practices and enforce all legislation, including EU policies relating to food.

Moreover, EFSA became the hub for this new multilevel regime. After the General Food Law passage, most of the food safety risk assessment mandate, held at the national level (initially MAFF, then FSA), was transferred to EFSA. As specified by the Regulation, EFSA was charged to: 'provide the Community institutions and the Member States with the best possible scientific opinions in all cases' (ibid: Article 23). Alternately, the Authority was mandated to establish a system of networks of national competent organisations and agencies across the member states, of which FSA was part. Subsequent regulations gave the Authority further responsibility to coordinate a common evaluation and authorisation procedures for novel foods, food additives, food enzymes, food flavouring[146] and genetically modified (GM) food and feed.[147] FSA and other food safety regulators in the UK, thus, became a subset within the broader EU system – responsible for undertaking delegated tasks from EFSA.

Another significant outcome of the reforms was the institutional and functional separation of the three main components of risk analysis (assessment, management, and communication). As explained in section 5.2, the general purpose of this institutional restructuring was to enhance the independence, neutrality and credibility of scientific risk assessment and advice and re-establish public confidence in the advisory and regulatory bodies. In the UK, it became evident with the creation of FSA as a non-ministerial department[148] separate from the ministerial department,[149] MAFF (and later, DEFRA), in charge of agri-food policy. At the EU level, EFSA was designated as an independent risk assessor, evaluating risks associated with the food chain. The European Commission (EC) and member states were in charge of making

[146] See Regulation (EC) 1333/2008

[147] See Regulation (EC) 1829/2003

[148] A non-ministerial department in the UK is a government department that does not have a minister but is accountable to Parliament through its sponsoring Minister.

[149] Ministerial departments are those departments that are led politically by a government minister.

risk management decisions. The separation represented a distinction and institutional boundary between scientific analysis and political management of food safety risks.

The post-reform regime also represented a shift from an opaque and technocratic organisational framework to an open and democratised regime. Unlike the pre-reform periods, the selection and appointment of scientific committees, panels, and working groups across all government tiers must be made openly and transparently. At EFSA and the FSA, scientific committee members were required to publish their interests to avoid any conflict of interest. All the risk assessment processes and the advice or opinions the risk assessors give are posted on their websites and other public domains. Further, the General Food Law charged EFSA to develop 'effective contacts with consumer representatives, producer representatives, processors, and any other interested parties.'[150] EFSA endeavoured to organise a twice-a-year Stakeholder Consultative Platform[151] to engage with interest groups across the EU and get them involved in the risk analysis processes. As explained by S3, a food policy expert, in an interview for this study:

> *'…this new arrangement opened "the former black box" of risk assessment to the general public'*.[152]

6.3.2 Policies

As discussed in section 5.2, the overall food policy goal of the EU since 2000 has been to have a uniform food safety standard and an integrated regulatory regime to safeguard the single market and consumer protection. This objective is reflected in the General Food Law, which sets the legal basis for harmonising food safety risk governance and standard-setting.

[150] See Article 42 of the General Food Law (Regulation (EC) No. 178/2002).
[151] The Stakeholder Consultative Platform is a permanent platform established by EFSA in 2005 as a forum for regular dialogue and exchanges among stakeholders in food safety governance.
[152] Interview, S3, 16 Feb. 2021.

The pursuit of this policy goal entailed changes in the volume, approaches, and strategies used in the design and implementation of domestic food safety policies in the UK.

The analysis of food safety legislation in the UK indicates that the amount of legislation originating from the EU[153] increased more than threefold in the post-reform period compared to the pre-reform time.[154] Additionally, the EU's legislation and regulatory scope shifted from a small target area to covering broader aspects of food safety. For instance, about 90% of the food safety legislation originating from the EU in the pre-reform period focused mainly on setting residue limits of chemicals in foodstuffs and hygiene of final products.[155] However, after the reforms, the regulatory scope was broadened to cover every stage and process within the value chain – from production, processing, and distribution to the placing of foodstuffs in the market.[156] The EU's legislative instruments on food safety also moved from being primarily directives to regulations,[157] which meant that the UK had no room for manoeuvre in terms of the choice of which instrument to use in implementing EU food safety rules. This development reflected the EU's objective to ensure uniform implementation and compliance with food safety standards. It also represented a shift in the locus of decision-making authority from the national to the EU level – depicting a top-down approach to food safety policymaking.

Moreover, because the reforms were triggered mainly by the food safety crises, new regulations appeared more stringent and precautionary in outlook. This included a tougher authorisation regime and labelling requirements for certain products and stricter safety limits

[153] See Food Safety Legislations originating from the EU. https://www.legislation.gov.uk/eu-origin/1986-2020?text=food%20safety

[154] See Food Safety Legislations originating from the EU. Cit. Loc. n. 153

[155] See Food Safety Legislations originating from the EU. Cit. Loc. n. 153

[156] See Food Safety Legislations originating from the EU. Cit. Loc. n. 153

[157] The EU has three main binding legislative acts: ***Regulations, Directives and Decisions.*** **A 'regulation'** is a binding legislative act that *must be applied in its entirety* across the EU. **A 'directive'** is a legislative act that *sets out a goal* that all EU countries must achieve. **A 'decision'** is binding on those *to whom it is addressed* (member state or an individual company), and it is directly applicable.

for additives,[158] pesticides,[159] veterinary medicine[160] and food contact materials.[161] Regulations on food ingredients, food composition and food additives also prohibit the use of certain substances or food[162] from the single market unless the Commission has approved it. In some instances, the prohibited food or substance is used widely in other countries. Typical examples include the ban on the use of chlorine in the treatment of poultry carcasses[163] and restrictions on GM foods and feeds.[164] New food labelling laws also demand mandatory presentation of the composition,[165] food origins[166] and health[167] or identification marks.[168] Regulations on food production and hygiene require full compliance with rules of origin[169] and specific border controls before food products can be imported into the EU market.

6.3.3 Politics

The shift in the locus of regulatory decision-making authority – including risk assessment and risk management functions – drew the attention of domestic actors, interest groups, and the contours of food safety politics to the EU level. As a result, the food industry, farmers, civil society groups, and consumer groups all began to exploit new channels to influence food policies from the top (at the EU level). For example, local consumer groups, such as Which? and the Consumer Council of Northern Ireland, teamed up with their European allies, the European Consumer Organisation (BEUC) in joint campaigns on food safety and consumer

[158] See Regulation (EC) No. 1333/2008
[159] See Regulation (EC) 396/2005
[160] See Regulation (EC) 470/2009
[161] See Regulation (EU) No 10/2011; Regulation (EC) No 450/2009; Regulation (EU) No 10/2011
[162] Examples include Regulation (EC) No. 1333/2008 on food additives; Regulation (EC) No. 1334/2008 on food flavourings; Regulation (EC) No. 2065/2003 on smoke flavourings; Regulation (EC) No. 1925/2006 on vitamins and minerals used in food and foods; Regulation (EC) No. 1829/2003 on genetically modified food and feed.
[163] See Regulation (EC) No. 1333/2008 and Regulation (EC) No. 853/2004
[164] See Regulation (EC) No. 1829/2003
[165] See Regulation (EU) No. 1169/2011 on the provision of food information to consumers
[166] See Article 24 of Council Regulation (EC) No 834/2007
[167] See Regulation (EC) No 1924/2006
[168] See Regulation (EC) No 110/2008
[169] See Regulation (EC) No 853/2004; Regulation (EC) No 853/2004; and Regulation (EC) No 854/2004

sovereignty.[170] This collaborative approach amplified their voices and contributed significantly to the passage of crucial EU legislation, such as the mandatory labelling of GM food, additives, and flavourings. The UK farming unions have also partnered with other EU farming groups to express their mutual concerns on specific regulatory issues. For instance, in 2013, all the national farmers' groups in the UK[171] joined hands with about ten other farmers' organisations from different EU member states to write an open letter[172] to the European Commission about the effects of GM policies and regulations on the sustainability of the agri-food sector within the EU.

Moreover, the interaction and socialisation of actors within this multilevel regulatory framework inherently impacted domestic interests, public discourses, norms, and values. First, the close network between domestic interest groups and their counterparts in the EU offered them the opportunity to compare the *status quo* in the UK with other member states. Through lesson drawing and cross-loading, new ideas were brought into the domestic discourse. For instance, when the EU gave member states the right to 'opt-out' from certain GM regulations,[173] Germany, Austria, and France introduced national schemes that allow consumers to know whether foodstuffs are GM-free or not.[174] The GM-free labelling discussion spread into UK public discourse through the media and campaign groups. As revealed in a press statement by Pete Riley of GM Freeze[175] after France legislated in favour of the labelling:

> *'The news from France is very welcome and adds to the pressure on the UK to provide people with clear information about the use of GM animal feed. All our political parties claim to be pro-choice when it comes to information about the use of GM, but so far none of them have proposed the GM-free labelling measures being adopted in other*

[170] BEUC (2001). Consumer Group Campaigns for GM Labelling.
[171] The UK has four main National Farming Unions: National Farmers Union (NFU), Ulster Farmers Union (UFU), National Farmers Union Scotland (NFUS) and National Farmers Union Wales (NFU Cymru).
[172] NFU (2013). EU farming groups join together on GM. https://www.nfuonline.com/archive?treeid=19052
[173] See Regulation (EC) No. 1829/2003.
[174] Pete Riley (04 Nov. 2009). GM Freeze - France to Introduce GM-free Labelling (Press Release). https://www.gmfreeze.org/press-releases/france-to-introduce-gm-free-labelling/
[175] GM Freeze is a not-for-profit campaign group in UK that opposes the patenting and cultivation of GM crops.

EU countries, some of whom are already exporting to the UK. They should all adopt this policy.'[176]

6.3.4 Conclusion

The preceding analysis confirms that there have been significant changes in the UK's food safety regulatory regimes since 1986. Notably, there has been a substantial shift of regulatory authority and decision-making mandate from the UK national to the EU level. There have also been considerable changes in the horizontal institutional layout of the regulatory processes – including the functional separation of risk assessment and risk management and the involvement of stakeholders in the risk analysis processes. EU food safety legislation in the UK has expanded in scope and number. Domestic actors have also explored other channels within the EU to enhance their participation in food safety governance processes. The interaction of domestic interest groups with different actors across the EU has facilitated the downloading, uploading, and cross-loading of ideas and norms to and from the UK.

Moreover, the analysis suggests that whereas the harmonisation and the expansion of EU regulatory activities brought about fundamental changes, the reforms were driven by internal crises, ideas, and recommendations. It could be inferred from the findings and the discussions that the EU drew inspiration from the James report and the Philips Inquiry in the design of the post-reform regimes. The UK had already begun its organisational re-arrangement – with the creation of FSA and DEFRA – before the EU started its reform in the same direction. Also, following the stress from the Salmonella and the BSE crises, the political culture in the UK (from both the public and the government) was already set for reforms; thus, the adaptational pressure from the EU was relatively low. It can, therefore, be concluded that the degree of Europeanisation in the UK's food safety regulatory regime has been 'low'.

[176] See Pete Riley (04 Nov. 2009). Loc. cit. n. 174 above

Part II: THE ANIMAL HEALTH AND WELFARE (AHAW) REGIME

'Desiring to ensure improved protection and respect for the welfare of animals as sentient beings… In formulating and implementing the Community's agriculture, transport, internal market and research policies, the Community and the Member States shall pay full regard to the welfare requirements of animals while respecting the legislative or administrative provisions and customs of the Member States…' – The Treaty of Amsterdam (1997)

6.4 Historical Overview of UK's AHAW Regulatory Regime

Animal Health and Welfare (AHAW) is now recognised globally as a primary indicator of sustainable agri-food systems (Keeling, 2005). This section assesses the historical development of AHAW regulatory regimes in the UK and the EU. It traces the origins of animal welfare discourse in industrial farming and the demand for regulatory standards in the UK. The section also reviews the development of agricultural antibiotics use, the rise of antimicrobial resistance (AMR), and the emergence of AMR regulatory discourse in the UK and the EU. Finally, it assesses the evolution of regulatory arrangements and strategies for the AHAW governance framework across the various tiers of government.

6.4.1 The Cognizance of Animal Welfare in the UK's Agri-food Regulatory Discourse

The discourse on Animal Health and Welfare (AHAW) in the UK has a long history. As far back as the 18th century, concerns about how animals are treated had been raised by some scholars and sections of the public (Keeling, 2005). However, until the 1960s, these concerns were expressed mainly in terms of animal cruelty or suffering, as observed in Hansard and the various animal protection legislation.[177] Ruth Harrison (1964), with her book 'Animal Machines'

[177] See The Protection of Animals Act (1911); Diseases of Animals Act 1950; The Protection of Animals (Anaesthetics) Act (1954)

is credited to have shifted the discourse from animal cruelty to animal welfare (Woods, 2012). Harrison posited that the post-war agricultural methods and practices contributed to the degradation of animals in appalling ways that 'have an impact on human self-respect…' (Harrison, 1964). She posited:

> '*To keep animals alive in the conditions in which they are reared, antibiotics are incorporated in their feed, and heavier doses of drugs given at the least sign of flagging; growth stimulants, hormones and tranquillisers all have their part to play in the forcing of rapid conversion of animal feeding-stuffs into flesh… Each year sees the introduction of new niceties and the exploitation of ever more animals'* (Harrison, 1964:35)

Pressure from the public and civil society organisations moved politicians across all the major political parties in the UK to enlist support for a parliamentary debate on the issues raised by Harrison.[178] Following this debate, MAFF, in June 1964, set up a technical committee headed by Professor Roger Brambell to further investigate the situation.[179] The committee's primary task was to 'examine the conditions in which livestock are kept under intensive husbandry systems and to advise whether standards ought to be set in the interests of their welfare and, if so, what they should be'.[180] The report addressed the general concept of animal welfare by emphasising the sentience of farm animals:

> *'… we accept that animals can experience emotions such as rage, fear, apprehension, frustration and pleasure.*[181]

The Committee concluded that the existing legislation on animal protection, the Protection of Animals Act 1911, was not adequate to safeguard the welfare and safety of farm animals.

[178] The Guardian (13 May 1964). MPs to seek debate on 'factory farms'.

[179] The Guardian (30 Jun. 1964). Inquiry on factory farms.

[180] See Page 1 of Brambell, F. W. R., & Technical Committee to Enquire into the Welfare of Animals kept under Intensive Livestock Husbandry Systems. (1965). *Report of the Technical Committee... Animals Kept Under Intensive Livestock Husbandry Systems*. HM Stationery Office.

[181] *See* Brambell Report. Cit. Loc. n. 94 above. Pages 9-10

Therefore, it recommended new legislation that would incorporate 'a fuller meaning of suffering' and animal welfare and give ministers the power to make regulations necessary to better the conditions of animals.[182] The report also acknowledged that farm practices kept evolving, and new husbandry methods may arise that exploit animals in one way or the other. Hence, the committee recommended the establishment of a Statutory Farm Animal Welfare Standing Advisory Committee – with relevant knowledge and expertise – to advise Ministers on all new development in the farming sector and their implications on animals' welfare.[183]

Brambell's report became the cornerstone of the UK's Agriculture (Miscellaneous Provisions) Act 1968. This legislation gave ministers the mandate to act on some of the critical recommendations of the Brambell committee, such as setting mandatory standards for livestock husbandry systems. Also, as recommended by the committee, the Farm Animal Welfare Council (FAWC) was established in 1979 to keep under review the welfare of farm animals and advise the government of any legislative changes that may be necessary.

6.4.2 Agricultural Antibiotic Use and the Emergence of AMR Concerns

The agricultural use of antimicrobial agents in the UK can be traced back to the early 1940s when penicillin and other antibiotics became commercially available to farmers (Bud, 2009; Woods, 2014; Cozzoli, 2014). In the post-war decades, backed by the government's policies to boost food production, medicated feeds and antibiotic growth promoters (AGPs) became lucrative.[184] By 1958, it was estimated that up to 50% of pigs were fed with antibiotics, and nearly all unweaned piglets had access to food containing tetracyclines (Smith, 1958).

[182] See Paragraph 224 of the Brambell Report. Cit. Loc. n. 94 above.
[183] *See* Paragraphs 228-229 of the Brambell Report. Loc. cit. n. 94 above.
[184] Kirchhelle, C. (2018). Pharming animals: a global history of antibiotics in food production (1935–2017). *Palgrave Communications*, *4*(1), 1-13

In July 1968, the government commissioned a review committee chaired by Professor Michael Swann to investigate antibiotic use in animal husbandry. The Swann Report[185] concluded that the excessive use of antibiotics in livestock farming had led to resistance in enteric bacteria of animal origin. It further explained that the enteric bacteria were transferable from animals to man and posed specific human and animal health hazards. The committee recommended a restriction on antibiotics that are important in human medicine – such as oxytetracycline, penicillin, and tylosin – as growth promoters. The report also proposed the formation of an advisory committee that would have the overall responsibility for the use of antibiotics in man, animals, and food preservation.

The government largely accepted the recommendations of Swann's committee. In the early 1970s, penicillin and tetracyclines were banned as AGPs in the UK. The Veterinary Products Committee (VPC) was also established in 1970 (under the Medicines Act 1968) to advise the Health and Agriculture Ministers on scientific issues relating to the authorisation and marketing of veterinary medicines. Domestic reports indicated that mass medication and illicit sales of restricted antibiotics were still pervasive despite the measures to restrict agricultural antibiotic usage.[186]

6.4.3 The UK's AHAW Regulatory Framework between 1986 and 2000

By 1986, the AHAW regulatory framework in the UK was underpinned by two main legislative instruments: the Agriculture (Miscellaneous Provisions) Act (1968) and the Medicines Act (1968). The legislation placed regulatory responsibilities for farm animal welfare and veterinary medicines under the Ministry of Agriculture, Fisheries and Food (MAFF) and the Department of Health (DoH). Two leading scientific advisory bodies existed within this regime: the Farm Animal Welfare Council (FAWC) and the Veterinary Products Committee (VPC) – to provide

[185] *See* Swann Report (1969). Use of Antibiotics in Animal Husbandry and Veterinary Medicine.
[186] *See* The Guardian (09 Aug. 1979). Illicit drug sales to farmers pose threat to public health. *The Guardian (1959-2003)*

scientific advice on matters relating to animal welfare and veterinary medicines. In 1989, the Veterinary Medicines Directorate (VMD) was set up within MAFF to take charge of the licensing of animal medicines.

Moreover, into the 1980s, the EU had already considered having a harmonised regulatory regime for AHAW for smooth operation and fair competition within the common market. As given in the Council Decision 78/923/EEC:

> *'Whereas the protection of animals is not in itself one of the objectives of the Community…however, there are disparities between existing national laws on the protection of animals kept for farming purposes which may give rise to unequal conditions of competition, and which may consequently have an indirect effect on the proper functioning of the common market'.*[187]

In July 1993, the EU passed Regulation (EEC) No 2309/93 to establish a centralised administration and supervision of medicinal products for human and veterinary use. The legislation established a European Agency for the Evaluation of Medicinal Products – now the European Medicines Agency (EMA) – administering a centralised approval procedure for human and veterinary medicines. The Agency was also charged with coordinating activities of member states and monitoring adverse reactions to medicinal products (pharmacovigilance).

6.4.4 The Expansion of EU's AHAW Regulatory Activities in the UK after 2000

Following the dissolution of the Ministry of Agriculture, Fisheries and Food (MAFF) in 2002, the Veterinary Medicines Directorate (VMD) was made an executive agency[188] of the Department for Environment, Food and Rural Affairs (DEFRA) responsible for making,

[187] *See* the introductory chapter of the Council Decision 78/923/EEC

[188] An executive agency is a part of a government department treated as managerially and budgetarily separate, responsible for carrying out statutory or regulatory functions on behalf of ministers or carrying out specialised functions particular to the core role of the sponsoring department.

updating, and enforcing UK legislation on veterinary medicines.[189] The Farm and Animal Welfare Council was renamed to Farm and Animal Welfare Committee (FAWC) with the same mandate – to provide independent scientific advice on animal welfare to DEFRA and devolved administrations in Scotland and Wales. The Veterinary Products Committee (VPC) was also maintained as an independent committee responsible for providing scientific advice concerning all aspects of veterinary medicinal products – including authorisation, marketing, and reporting suspected adverse events of veterinary medicines – to VMD and DEFRA.

Moreover, after the establishment of EFSA – coupled with the EU's objective to promote the development of harmonised science-based animal health and welfare standards – the Animal Health and Welfare (AHAW) panel was set up to be in charge of risk assessments on all aspects of animal diseases and animal welfare. The Panel was charged with establishing networks among member states to establish common principles, practices, and methodologies to promote the harmonisation of animal health and welfare risk assessment and reduce the duplication of activities. The panel's opinions and technical reports provided the scientific basis for most EU animal welfare legislation. For instance, Council Regulation (EC) No 1/2005 on the protection of animals during transport is essentially based on the conclusion and recommendations of the 2004 scientific opinion of the AHAW panel.[190] The panel has also been tasked on numerous occasions to review the scientific basis of some existing AHAW legislation.[191]

Agenda 2000 and the 2003 reforms of the Common Agricultural Policy (CAP)[192] incorporated animal health and welfare as part of the 'cross-compliance' requirement for farmers.[193] The

[189] See https://www.gov.uk/government/organisations/veterinary-medicines-directorate/about

[190] *See* The EFSA Journal (2004). The welfare of animals during transport. Scientific Opinion. 44, 1-36, https://efsa.onlinelibrary.wiley.com/doi/pdf/10.2903/j.efsa.2004.44

[191] *See* The EFSA Journal (2012). The role of EFSA in assessing and promoting animal health and welfare. 10(10):s1002

[192] The Common Agricultural Policy (CAP) is an EU policy launched in 1962 to provide agricultural support and subsidies to farmers and landowners. *See https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en*

[193] *See* Annex II of the Council Regulation (EU) No 1306/2013

rules on cross-compliance consist of statutory management requirements (SMRs) – which apply to all farmers whether or not they receive income support under CAP – and good agricultural and environmental conditions (GAEC) – which apply only to farmers receiving support under the CAP. The SMRs on AHAW include EU regulations on the identification and registration of pigs, bovine, ovine and caprine animals,[194] regulations on prevention, control, and eradication of transmissible spongiform encephalopathies,[195] directives on the protection of calves, pigs and animals kept for farming purposes.[196] A farmer that violates any of the SMRs or the GAEC faces a penalty or a reduction in their EU support.

Additionally, the EU adopted a 'Community Strategy against Antimicrobial Resistance' to enhance communitywide cooperation in surveillance and prudent management of antimicrobial usage among member states in 2001. Following the action plans, the EMA, in 2009, launched the 'European Surveillance of Veterinary Antimicrobial Consumption (ESVAC)'[197] project to harmonise the collection and reporting of data on antimicrobial usage in animals from the Member States. The European Centre for Disease Prevention and Control (ECDC) established the European Antimicrobial Resistance Surveillance Network (EARS-Net), comprising about 700 laboratories in 28 countries, to connect all national surveillance systems.[198] The broad objective of the EARS-Net was to help collect and analyse temporal and spatial trends of AMR in Europe and provide accurate and timely data for AMR policy decisions.

The EU also launched an 'Action plan against the rising threats from Antimicrobial Resistance'[199] in 2011 to reinforce the initial AMR control measures. This strategy recognised

[194] *This includes* EU regulation 1760/2000; Council Directive 2008/71/EC; EU Regulation 21/2004
[195] *This includes* EU Regulation 999/2001
[196] *This includes* Council Directive 2008/119/EC; Council Directive 2008/120/EC; Council Directive 98/58/EC
[197] *See* EMA (2011). Sales of veterinary antimicrobial agents in 25 EU/EEA countries in 2011. Third ESVAC report
[198] *See* ECDC 2010. European Antimicrobial Resistance Surveillance Network. https://www.ecdc.europa.eu/en/about-us/networks/disease-networks-and-laboratory-networks/ears-net-about
[199] See European Commission (2011). Action Plan against the Rising Threats from Antimicrobial Resistance. (COM(2011) 748)

how resistance spreads between countries when food and feed are traded and stressed the need for coordinated efforts across borders. The *Commission Decision 2013/652* was passed to lay down a harmonised programme of monitoring of samples collected from certain farm animals, including poultry, pigs, and cattle. In 2019, the EU passed *Regulation (EU) 2019/6* on veterinary medicinal products (repealing *Directive 2001/82/EC)*. The regulation placed a ban on the preventive use of antibiotics in groups of animals and the preventive use of antimicrobials via medicated feed.

6.5 Findings and Discussions: Europeanisation of UK's AHAW Regulatory Regimes

Section 6.4 above reviews the historical development of the UK's AHAW regulatory regime, focusing on the source and origin of ideas and discourse from the UK and the EU. This section assesses the impact of the EU's regulatory activities on domestic structures, interests, and procedures for AHAW governance in the UK. Specifically, it analyses the changes in polities, policies, and politics of AHAW governance in the UK. It looks out for institutional 'misfits' and adaptation pressure from the EU since the Single European Act (SEA).

6.5.2 Polities

The principal change in the organisational arrangement for AHAW governance was the shift in regulatory authority from the national to the EU level. For instance, before the mid-1990s, the Veterinary Medicines Directorate (VMD) was in charge of all the regulatory functions concerning veterinary medicinal products, including pre-authorisation, marketing, and post-authorisation assessment. However, after the creation of the European Medicines Agency (EMA), the regulatory system became two-tiered – entailing centralised and decentralised structures. The centralised procedure allowed the marketing of medicine based on a single EU-wide assessment and marketing authorisation which was valid throughout the EU, whereas the decentralised authorisation was valid at the national level. The centrally

authorised procedure was compulsory for most innovative medicines; thus, most of the approval functions were moved to the EU level.

Moreover, VMD and its advisory committees became part of a broader network of national competent authorities (NCAs) within the EU. For example, all the NCAs responsible for regulating veterinary medicines created a Heads of Medicines Agencies (HMA) forum.[200] The HMA worked closely with EMA and the European Commission to maximise cooperation, streamline mutual recognition, and ensure that the European medicines regulatory network functions efficiently. EFSA also formed a 'Scientific Network for Risk Assessment in Animal Health and Welfare',[201] involving all national advisory bodies in charge of AHAW regulations. The ESVAC and the EARS-Net projects furthered the cooperation between national authorities and EU bodies in sharing information, scientific facilities, and best practices to ensure the efficient functioning of the harmonised regimes.

The adoption of the World Organisation for Animal Health (OIE) standards[202] as the reference for the World Trade Organisation's (WTO) Sanitary and Phytosanitary (SPS) Agreement[203] in 1998 created a global tier in the UK's AHAW governance framework. This arrangement aimed to improve AHAW standards across global supply chains while strengthening collaboration and facilitating the settlement of sanitary disputes between countries. Within this framework, EFSA and the European Commission (EC) coordinated and represented the position of all EU member states at OIE. In 2011, the EC and the OIE concluded a Memorandum of Understanding[204] to enhance cooperation and exchange of information. They agreed to

[200] Information about the Heads of Medicines Agencies on https://www.hma.eu/

[201] *See* EFSA (2018). Report of EFSA Scientific Network for Risk Assessment in Animal Health and Welfare (2015-2017)

[202] The OIE is an intergovernmental organisation established in 1924 responsible for improving animal health worldwide

[203] The Agreement on the Application of Sanitary and Phytosanitary Measures (the "SPS Agreement") entered into force with the establishment of the World Trade Organization on 1 January 1995. It concerns the application of food safety and animal and plant health regulations.

[204] Memorandum of Understanding between the European Commission and the World Organisation For Animal Health (OIE) concerning their general relations

involve their experts in technical or specialist conferences and meetings, training or conferences organised by the OIE or the EC.

6.5.3 Policies

The significant change in the UK's AHAW policy domain has been the increase in the number and scope of EU rules and legislation. Until the 1990s, the formulation and design of AHAW policies were primarily conducted at the national level. Following the SEA, the EU's primary interest in AHAW was bridging national regulatory differences to ensure fair competition within the single market. Hence, during the 1990s and the 2000s, the EU progressively expanded the scope of its regulations to cover broader aspects of AHAW – from farming,[205] transportation[206] and slaughtering[207] of farm animals. The EU also adopted legislation to harmonise the animal health requirements and authorise veterinary medicinal products.[208] Additionally, AHAW regulations were captured under the cross-compliance and single payment requirements of the Common Agricultural Policy (CAP).[209]

Into the 2010s, around 80% of UK animal welfare policies were based on EU rules and legislation. However, about 85% of these regulations (originating from the EU) were in the form of directives – which meant the EU sets the minimum standards, and member states design their national rules and policies around it. This type of regulation offered the UK the flexibility to develop AHAW policies that suit national norms and policy goals. For instance, the Pigs Directive (2008/120/EC) – laying down minimum standards for the protection of pigs

[205] Livestock farming activities are covered by five primary EU *directives*: Council Directive 98/58/EC; Directive 2008/1193: Calves; Directive 2008/1204: Pigs; Directive 1999/745: Laying hens; Directive 2007/438: Chickens for meat production

[206] *See* Regulation 1/2005 on the Protection of animals during transport and related operations and amending Directives 64/432/EEC and 93/119/EC and Regulation (EC) No 1255/97

[207] *See* Council Directive 93/119/EC on the protection of animals at the time of the killing

[208] *See* Regulation (EEC) No 2309/93 laying down Community procedures for the authorisation and supervision of medicinal products for human and veterinary use

[209] *See* European Commission Cross-Compliance. https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/income-support/cross-compliance_en

– placed a partial ban on sow stalls;[210] the UK, however, adopted a complete ban on sow stalls usage.

Another noticeable development in the AHAW regulatory domain is the blend of different policy instruments such as command and control (C&C), economic instruments, and voluntary schemes. For example, the ban on the prophylactic use of antibiotics and AGPs and the 'sow stall ban' took the form of C&C. The cross-compliance requirements of the CAP, in contrast, used economic incentives as a regulatory instrument. In recent decades, there have also been several industry-led and voluntary AHAW initiatives within the UK. For instance, six major supermarkets (Tesco, Co-op, Lidl, M&S, Sainsbury's, and Waitrose) banned their suppliers from the routine use of antibiotics for disease prevention as part of their corporate sustainability policies.[211] The Responsible Use of Medicines in Agriculture Alliance (RUMA) also took voluntary action in 2015 to restrict colistin – a last-resort antibiotic.[212] Some notable food assurance organisations like the Red Tractor incorporated AHAW principles in their certification requirements.[213] These voluntary actions have made significant contribution to the reduction of farm antibiotic use in the UK.[214]

6.5.4 Politics

The network-based governance framework that emerged as a result of the harmonisation of the AHAW regime affected the organisational culture of UK domestic actors – including the way and manner of interaction and participation in the regulatory processes. Domestic interest

[210] *See* Directive (2008/120/EC) prohibits the use of sow stalls except for the first four weeks in a sow's pregnancy.
[211] *See* Alliance to Save Our Antibiotics (2020). Supermarket antibiotics policies assessment 2019. Report. https://www.saveourantibiotics.org/media/1826/supermarket-antibiotics-policies-assessment-2020-report.pdf
[212] *See* RUMA (2020). Voluntary restrictions to use of colistin in farm animal treatments (imposed December 2015). https://www.ruma.org.uk/voluntary-restrictions-to-use-of-colistin-in-farm-animal-treatments-imposed-december-2015/
[213] Red Tractor Standards. https://assurance.redtractor.org.uk/standards.
[214] *See* Alliance to Save Our Antibiotics (2020). Loc. cit. n. 211 above

groups explored multiple routes of influence – the opportunity to lobby either at the national or the EU level. Also, domestic actors, especially civil society organisations (CSOs) and environmental NGOs mastered how to report to UK authorities if they go contrary to EU rules. For instance, the Alliance to Save Our Antibiotics reported the UK to the EMA for misinterpreting the EU directive on the advertisement of antibiotics to farmers. As explained by C1, a senior member of the Alliance to Save Our Antibiotics (ASOA):

> *'…the UK refused to ban the advertising of antibiotics to farmers, even after the directive. And there was a consultation at EMA in 2011 …and during that consultation, we pointed out to the EMA committee that it was still legal to advertise these directly to farmers, despite the EU directive that had come into force five years earlier. In response, the EMA committee reported to the European Commission, and subsequently, the European Commission told the UK that it had to ban the advertising of antibiotics directly to farmers. And then in 2013, the UK complied'.*[215]

Moreover, the convergence of member states with different policy outlooks intensified AHAW regulatory politics at the EU level and eventually translated into domestic politics. For instance, after implementing Swann's recommendation of a partial AGP ban, the UK was locked into market-based and industry-led antibiotic regulations in the subsequent decades. The UK was hesitant to bring in further restrictions and reforms on agricultural antibiotic use (Kirchhelle, 2018). However, in 1995, after the accession of Sweden – which had stricter AGP regulations – they embarked on a campaign for a broader AGP ban. The campaign was eventually supported by other member states and domestic consumer groups. In 1996, Denmark and Germany banned avoparcin[216] - an AGP which had been banned in Sweden since 1986 but was still used in the UK.[217] After initially rejecting the ban based on lack of scientific evidence,

[215] Interview, C1, 10 Jun. 2020.
[216] The Times (15 Dec. 1998). Europe puts a ban on farm antibiotics. The Times (London).
[217] Avoparcin was temporarily licensed as a feed additive for non-lactating dairy cattle between 1996 and 1997; Hansard—House of Commons Daily Debates, 18.03.1997, Col. 560.

in 1997, the UK supported an EU-wide ban on a precautionary basis.[218] As explained by Nick Brown, the then-Minister for Agriculture:

> *'These antibiotics [avoparcin] are not dangerous in themselves - but the scientific evidence gathered by the European Commission, which parallels research in the UK, is that human resistance to medicines is reduced'.*[219]

The new organisational arrangement for AMR research and development also affected the UK's research culture.[220] First, the emergence of EU research networks and intelligent sharing databases such as EARS-Net, ESVAC and research frameworks encouraged interdisciplinarity, cross-border collaboration and researcher mobility. These networking opportunities enabled UK researchers to gain access to additional facilities, expertise, new perspectives, and the opportunity to build relationships with other experts in their field. As explained by Elizabeth Truss, the UK's former Secretary of State for Environment, Food and Rural Affairs:

> *'While we are leading the way here in the UK, we also clearly benefit from being part of the EU's joined-up network. This makes us able to prepare for and manage the risk of serious animal disease more effectively than we could on our own…; we benefit from EU-wide surveillance, access to world-class scientists, laboratory facilities and additional funding to boost our own capability. This has helped reduce the spread of diseases… which could otherwise have had a serious impact on our animals and our economy'.*[221]

[218] The Times (15 Dec, 1998). Cit. Loc. n. 216 above.
[219] The Times (15 Dec, 1998). Cit. Loc. n. 216 above.
[220] Research culture encompasses the behaviours, values, expectations, attitudes, and norms of the research communities. *See* Royal Society (2020). https://royalsociety.org/topics-policy/projects/research-culture/
[221] Truss (2016). "EU Membership – Benefits for Animal Health and Welfare." Veterinary Record 178.18: 435.

6.5.5 Conclusion

The preceding analysis shows that there have been considerable changes in the UK's AHAW regulatory regimes over recent decades. There has been a progressive attempt to enhance animal welfare standards and harmonise these standards within the EU and worldwide. This development led to the creation of a multilevel regulatory polity in which the UK domestic structures became part of the broader regulatory network of the EU. It entailed a shift in regulatory and decision-making competence (initially concentrated at the national level) to be shared between the UK and EU bodies. Also, EU legislation expanded both in scope and number to cover all the aspects of AHAW – from production, transportation, and the slaughter of farm animals. The new multi-level, network-based institutional arrangement facilitated downloading and cross-loading of norms and practices from the EU and other member states.

Moreover, the analysis affirms that the UK was one of the pioneers of animal welfare legislation and maintained that position after joining the EU (Simonin & Gavinelli, 2019). For instance, following the Brambell Committee's report and the passage of the Agriculture (Miscellaneous Provisions) Act 1968, the UK became one of the first countries in the world to recognise animals as sentient beings. The UK lobbied the EU for such recognition of the sentience of animals upon its accession, which eventually resulted in the Treaty of Amsterdam in 1997[222] and reinforced in Article 13 of the Treaty of Lisbon. The UK also had a significant influence on key animal welfare regulations such as the bans of veal crates (2007), barren battery cages (2012), and the regulation of sow stalls (2013). Further, the recommendations of the Brambell Committee and the establishment of FAWC served as the blueprint for the setting up of independent scientific advisory bodies for animal welfare governance in the EU and worldwide. In summary, the UK uploaded a significant share of its animal welfare principles into EU legislation and regulatory discourse. Thus, the adaptational pressure from the EU and the degree of Europeanisation in this arena were '*low'* – because the UK did not

[222] The Treaty of Amsterdam was signed on 2 October 1997 to amend the Treaty on European Union and certain related acts.

make any substantial adjustments to its institutional framework to incorporate EU policies and principles.

Regarding animal health and veterinary medicines, the analysis reveals that the UK was among the first countries to regulate agricultural antibiotic use. Also, following the Swann Committee's recommendation, the UK already had an advisory body on veterinary products before it joined the EU. However, it became locked in the path of partial restrictions while adhering to industry-based and voluntary measures. In the late 1990s and the 2000s, when the EU adopted stricter regulations on antibiotic growth promoters (AGPs), adaptational pressure on the UK became high. Eventually, the UK 'accommodated' the EU's decision to ban all AGPs.

Part III: THE PLANT PROTECTION PRODUCTS REGULATORY REGIME

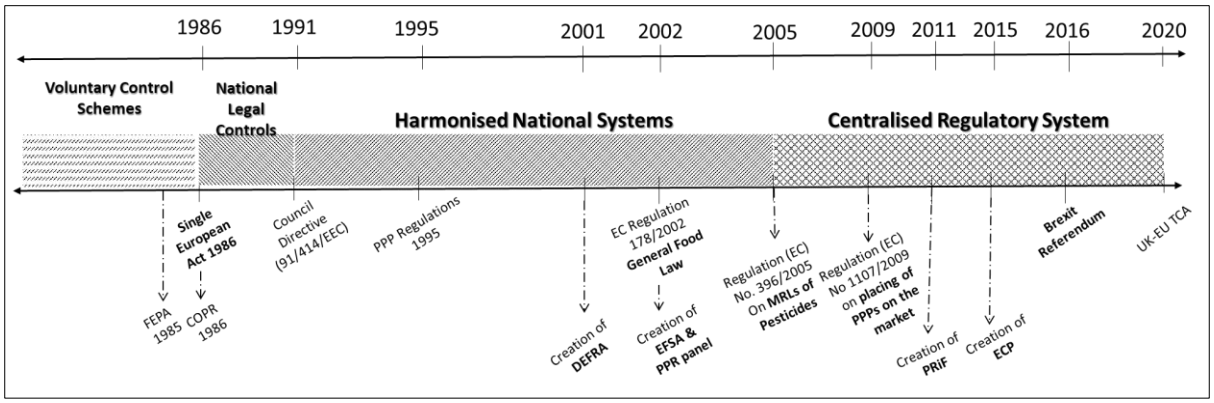
'Plant production yields are continually affected by harmful organisms including weeds…one of the most important ways of protecting plants and plant products and of improving agricultural production is to use plant protection products…their use may involve risks and hazards for humans, animals and the environment…in view of the hazards, there are rules in most Member States governing the authorization of plant health products…these rules present differences which constitute barriers not only to trade in plant protection products but also to trade in plant products, and thereby directly affect the establishment and operation of the internal market…it is, therefore, desirable to eliminate such barriers by harmonizing the provisions laid down in the Member States'. – Council Directive 91/414/EEC

6.6 Historical Overview of UK's Plant Protection Products (PPP) Regulatory Regimes

Plant Protection Products (PPPs) have become an integral part of modern agriculture – used for protecting plants and crops from pests, pathogens, and weeds. However, since their active

substances may be hazardous to human, animal, and environmental health, they are regulated worldwide (Bonnano et al., 2017). This section reviews the historical development of PPP regulatory governance in the UK and the EU. First, it traces the emergence of the regulatory discourse and public concerns over PPP use in the UK since the post-war periods. Then, it assesses how the policies, strategies, and institutional arrangements for PPP governance in the UK evolved since the adoption of the Single European Act (SEA) in 1986. Figure 5.2 gives a graphical illustration of the key development in the UK's PPP regulatory regime in the past decades.

Fig 6.2: Graphical Overview of Key Developments in the UK's PPP regulatory regime



Source: Developed by the Author

6.6.1 The Emergence of PPP Regulatory Discourse in the UK

Public concerns about the possible risks of PPPs, especially synthetic pesticides, began in the late 1940s following some incidents of accidental poisoning of agricultural workers in the UK (Bates, 1965). In 1951, amidst public outcry, the Ministry of Agriculture and Fisheries (MAF) established a working party chaired by Professor Solly Zuckerman to inquire into the use of toxic chemicals in agriculture. The Zukerman Party proposed labelling requirements for agrochemical manufacturers and the power to enforce legal provisions to Agricultural

Departments.[223] These recommendations formed the basis of the Agriculture (Poisonous Substances) Act 1952, which sought to protect agricultural workers from agrochemical poisoning.

In 1953, Zuckerman's Party published its second report entitled, 'Residues in Food'.[224] The report pointed out that the increase in new pesticides without sufficient knowledge has generated public fears. Therefore, they recommended the establishment of a voluntary notification scheme for the introduction of new products where manufacturers and importers would get prior clearance from the Agricultural Departments before they bring new products into the market. The report also recommended the establishment of an Advisory Committee to advise ministers on possible risks from pesticides to consumers, the information needed for new products to be marketed, and the maximum permissible residue limits. The second report led to the Advisory Committee on Poisonous Substances Used in Agriculture and Food Storage – later the Advisory Committee on Pesticides (ACP) – in 1954. Also, following the recommendations of the second report, the Notification of Pesticides Scheme – later called the Pesticides Safety Precautions Scheme (PSPS) – was designed in 1957 as a voluntary scheme between relevant government departments[225] and representatives of the pesticide industry. The system entreated manufacturers to provide their PPPs' physical, chemical, and biological composition. These data were supposed to be submitted to the ACP, which scrutinises and advises departments on the approval procedures for products.[226]

In 1955, Zuckerman's working party published its third report entitled, 'Risks to Wildlife'.[227] The report focused on the possible effects of pesticides on wildlife, fisheries, and accidental

[223] Ministry of Agriculture and Fisheries. (1951). Toxic Chemicals in Agriculture. Report of the Working Party on Precautionary Measures Against Toxic Chemicals Used in Agriculture. London: HMSO.
[224] Ministry of Agriculture and Fisheries. (1953). 'Residues in Food'. Report of the Working Party on Precautionary Measures Against Toxic Chemicals Used in Agriculture. London: HMSO.
[225] These were the MAFF, the Department of Health, and Social Security (DHSS), the Department of the Environment (DoE), the Health and Safety Executive (HSE) under the Department of Employment (DoEm)
[226] *See* PSPS (1979). Pesticides Safety Precautions Scheme. MAFF. London.
[227] Ministry of Agriculture, Fisheries and Food. 1955. 'Risks to Wildlife'. Report of the Working Party on Precautionary Measures Against Toxic Chemicals Used in Agriculture. London: HMSO.

poisoning of farm animals. It suggested that, although there had been a lot of comments about wildlife deaths and changes in hedgerows and verges, it was not possible to measure the extent of the danger. However, it classified the dangers as 'undefined dangers' that should be minimised to reduce public concerns. The report also emphasised that the long-term effects of PPPs on the plant life of the countryside were complex, and there were significant gaps in understanding the relationships. Therefore, they advocated for more field studies and research.

In the late 1950s and early 1960s, there were reports of widespread wildlife mortality connected to the new compounds introduced in the mid-1950s.[228] For instance, 6000 birds were reported to have died on one estate in Lincolnshire after eating seeds dressed in these compounds.[229] There were also reports of 'secondary poisoning' among wildlife and domestic animals.[230] Following pressure from the public and the media, MAFF asked the ACP to review the existing voluntary safety arrangements, especially the pre-market clearance of products, and consider whether new legislation would be desirable.[231] The Committee highlighted that while existing schemes for the safe use of pesticides had worked well, there was still the need to establish a mandatory licensing system.

MAFF accepted the committees' recommendations and drafted a 'Pesticides Bill'. The Bill included mandatory licensing controls on the supply and labelling of products used in agriculture and food storage in 1968. The Bill was meant to replace the Agriculture (Poisonous Substances) Act of 1952 and the Farm and Garden Chemicals Act of 1967. However, in 1972, MAFF officially abandoned it, expressing that the existing voluntary scheme had begun working effectively. As described by the then-Minister of Agriculture, Mr Prior:

[228] The Guardian (14 Feb. 1961). POISON ON THE LAND. The Guardian (1959-2003)
[229] The Guardian. (Jun 20, 1963). 'Chemicals, plants and wildlife'. *The Guardian (1959-2003)*
[230] The Guardian (14 Feb. 1961). Cit. Loc. n. 228 above.
[231] See MAFF (1964). HCDebs 692:244.

'...the PSPS is now working so effectively…legislation could prove essential if the voluntary scheme lost any of its present effectiveness or if there were new technological developments for which voluntary controls would not be appropriate.[232]

Moreover, in 1972, the European Economic Community (EEC) proposed joint action and regulations against pollution and pesticide residues[233] before the UK joined the Community in 1973. The Community adopted Directive (76/895), which obliged Member States to establish a maximum permitted residue level for pesticides in specified fruit and vegetables; Directive 78/631, which sets safety requirements for packaging and labelling; and Directive 79/117, which prohibits the marketing and use of pesticides containing mercury and organochlorine compounds. Initially, the UK did not implement these Directives by statute but made compliance arrangements under the Pesticides Safety Precautions Scheme (PSPS). However, pressure from the EU and domestic interest groups led to the inclusion of pesticide controls in the Food and Environment Protection Act (FEPA) 1985 and the adoption of the Control of Pesticide Regulations (COPR) in 1986.

6.6.2 The UK's PPP Regulatory Regime between 1986 and 2000

From 1986 onwards, the two main legal acts, FEPA 1985 and COPR 1986 underpinned the PPP regulatory regime in the UK. This legislation also marked the beginning of the shift from voluntary measures to legal controls. Part III of the FEPA was dedicated solely to PPP controls: to ensure the continuous development of secure and effective measures to protect human, animal and plant health and make information about pesticides available to the public (ibid: 16). The Act gave the power to control the sale, supply, use, storage, importation, and advertisement of pesticides to the Ministry of Agriculture, Fisheries and Food (MAFF) and the Department of the Environment (DoE). The two departments were also responsible for setting

[232] MAFF (1972). Minister Speaks About Proposed Pesticide Safety Legislation. Press Notice
[233] The Guardian (29 Mar. 1972). EEC plans joint action against pollution. *The Guardian (1959-2003)*

Maximum Residue Limits (MRLs) of pesticides in crops, food, and feeds and for making information about pesticides available to the public.

Further, the Act gave the Ministers the statutory mandate to appoint the Advisory Committee on Pesticide (ACP) members and its chairperson. The Ministers were obliged to consult the ACP about regulations, pesticide approvals, conditions on licences, and other matters concerning pesticides and pest controls (ibid: 38). Moreover, the ACP was required to send a report concerning the performance of the committee's function each year to Ministers. Additionally, Ministers determined all issues concerning the advisory committee, including their terms of office, remuneration, and allowances. This arrangement meant there was no functional or institutional separation between the advisory body and the risk managers.

As part of the Single European Act's (SEA) objective of establishing a single market by 1992, the EU adopted the Council Directive (91/414/EEC) in 1991. The broad intent of the Directive was to harmonise the authorisation regime of PPPs to eliminate national differences, which act as barriers to trade and the operation of the internal market. The Directive stipulated:

> *'…in the interests of free movement of plant products as well as of plant protection products that authorization granted by one Member State, and tests carried out with a view to authorization, should be recognized by the other Member States, unless certain agricultural, plant health and environmental (including climatic) conditions relevant to the use of the products concerned are not comparable in the regions concerned'. (ibid:7)*

The Directive also demanded data and information sharing among national competent agencies regarding new and approved PPPs and active ingredients. As specified:

> *'…it is therefore desirable that a system for the mutual supply of information should be established and that Member States should make available to each other on request the particulars and scientific documentation submitted in connection with applications for authorization of plant protection products.'(ibid:7)*

In implementing the Council Directive 91/414/EEC and the subsequent amending Directives,[234] MAFF adopted the Plant Protection Products Regulations in 1995. Under this Regulation, applications for new active substances needed to be submitted to the Ministers, the relevant competent authorities, and the European Commission (EC). The Regulation lays down the condition for mutual recognition of approval of PPPs authorised under the Directive. Applicants of PPPs approved in any other Member State were only supposed to substantiate the comparability requirement[235] with documentary evidence. If satisfied, there would not be any repetition of tests concerning its authorisation in the UK.

6.6.3 The post-2000 PPP Regulatory Regime in the UK

Regulation (EC) No 178/2002 gave the European Food Safety Authority (EFSA) the mandate to assess all scientific and technical issues relating to the agri-food system. Given that PPPs have potential risks to human, animal, and environmental health, their evaluation and authorisation were to be carried out by the Authority in line with the Council Directive 91/414/EEC. Consequently, the Panel on Plant Protection Products and their Residues (PPR) was established within EFSA to assume the responsibility of risk assessment to support the evaluation of active substances. The PPR draws on the Member States' expertise and the National Competent Agencies.

In 2005, the European Parliament and the Council passed Regulation (EC) No. 396/2005 to repeal and replace all the existing EU directives on pesticide residues.[236] The broad intent of the regulation was to establish a uniform Maximum Residue Limit (MRL)[237] that does not require transposition into national law to ensure free movement of goods, equal competition,

[234] *See* Commission Directive 93/71/EEC, Commission Directive 94/37/EC, Commission Directive 94/79/EC

[235] 'Comparability requirement' under the PPP Regulations 1995 meant agricultural, plant health and environmental conditions relevant to the use of the PPP must be comparable in the UK.

[236] *The existing EU Directives on Pesticides were* Council Directive 76/895/EEC; Council Directive 86/362/ EEC; Council Directive 86/363/EEC and Council Directive 90/642/EEC.

[237] MRL is the upper legal level of a concentration for a pesticide residue in or on food or feed, based on good agricultural practice and the lowest consumer exposure necessary to protect vulnerable consumers.

and a high level of consumer protection across the Community. The Act mandated the European Commission (EC) to set an MRL for all active substances that would be approved after consultation with EFSA. The Commission was also responsible for establishing "import tolerance"[238] when an active substance not authorised within the EU is used on an imported product, or the existing MRL for the product was set for reasons other than public health.

In 2009, following the progress report presented by the Commission, the Council passed Regulation (EC) No 1107/2009 to repeal Directives 79/117/EEC and 91/414/EEC. The Regulation was intended to ensure the highest level of protection from PPPs and safeguard the competitiveness of the Community's agriculture. The regulation sets a dual frame of approval and authorisation of PPPs. The first phase is evaluating and approving active ingredients, done at the EU level. And the second phase is the evaluation and authorisation of commercial products carried out by member states at the national level.

A specific feature of Regulation 1107/2009 in the authorisation of PPPs is the use of the 'precautionary principle' as a legal benchmark. As expressed in the Act:

> *'…the provisions of this Regulation are underpinned by the precautionary principle in order to ensure that active substances or products… do not adversely affect human or animal health or the environment.'* (ibid: 6)

Under this provision, the Member States have the mandate to stop using or not authorising PPPs when there is scientific uncertainty about the risks concerning human or animal health or the environment. Members can also impose appropriate conditions relating to their various National Action Plans adopted under the Sustainable Use Directive.[239]

In 2011, the Expert Committee on Pesticide Residues in Food (PRiF) was formed in the UK to provide independent advice to the Chemicals Regulation Directorate (CRD) of the Health

[238] Import tolerance are MRLs set for imported products to meet international trade needs.

[239] Sustainable Use Directive (2009/128/EC) is a complimentary directive that aims to reduce the risks and impacts of pesticides by promoting Integrated Pest Management (IPM) and other approaches such as non-chemical alternatives to pesticides.

and Safety Executive (HSE) and the Food Standards Agency (FSA) on pesticide residues in the UK. The ACP was also abolished and replaced by the UK Expert Committee on Pesticides (ECP). The ECP was mandated to provide independent advice to the government on pest controls and PPP approval and authorisation.

6.7 Findings and Discussions: Europeanisation of the UK's PPP Regulatory Regimes

Section 5.6 above analysed the evolution of discourse and the harmonisation of the UK's regulatory structures for PPP governance. This section assesses the outcome of the integration and the expansion of the EU's regulatory activities on the domestic arrangements, policy styles and processes for PPP governance in the UK. Specifically, the section breaks down and analyses changes in the UK's polities, policies, and politics of PPP governance over the decades and looks at locally-driven ones and those that emerged from the EU.

6.7.1 Polities

As illustrated in figures 5.3 and 5.4 below, the fundamental change in the organisational arrangement of the UK's PPP regulatory regime was the shift from a simple nationalised regulatory framework to complex multi-level regulatory architecture. This entailed the transfer of regulatory authorities from the UK national level to the other vertical tiers of government, especially the EU. For instance, at the beginning of 1986, all PPP regulatory responsibilities, including approval of new active substances and the setting of MRLs, were mainly in the hands of UK agencies. However, by 2016, most of these functions had either been transferred to EU bodies or a shared competence between UK and EU agencies. For instance, Regulation (EC) No. 396/2005 shifted the authority to set MRLs from MAFF and HSE to the European Commission (EC). Further, the establishment of EFSA and the passage of Regulation 1107/2009 led to the transfer of a large sum of the pesticide risk assessment functions from the UK's pesticide advisory body, ACP (later ECP and PRiF), to PPR. Moreover, the adoption

of Codex MRL (CXL)[240] by the WTO as an international standard fostered the global dimension of the UK's PPP regulatory regime.

EFSA and the EC served as the centre point of the new framework connecting the UK's pesticide regime with global bodies and competent agencies of other member states. For instance, EFSA was mandated to represent the interest of EU Member States at the Codex Alimentarius Commission's meetings, particularly in the setting of CXL. Also, by its mandate to promote cooperation among scientific organisations of the EU Member States, EFSA formed 'the Pesticide Steering Network (PSN)' – comprising national competent agencies, representatives of the EC and other organisations with expertise in pesticides. As S12, a regulatory policy expert, posits:

> *'The role of EFSA in pesticide management and regulation in Europe cannot be overestimated… especially, at a time when cooperation has become more necessary…EFSA, through its panels and networks, manages to mobilise all resources and expertise from the Member States in a constructive atmosphere…These networks provide a positive opportunity for a multidimensional and multicultural approach to risk governance...'*[241]

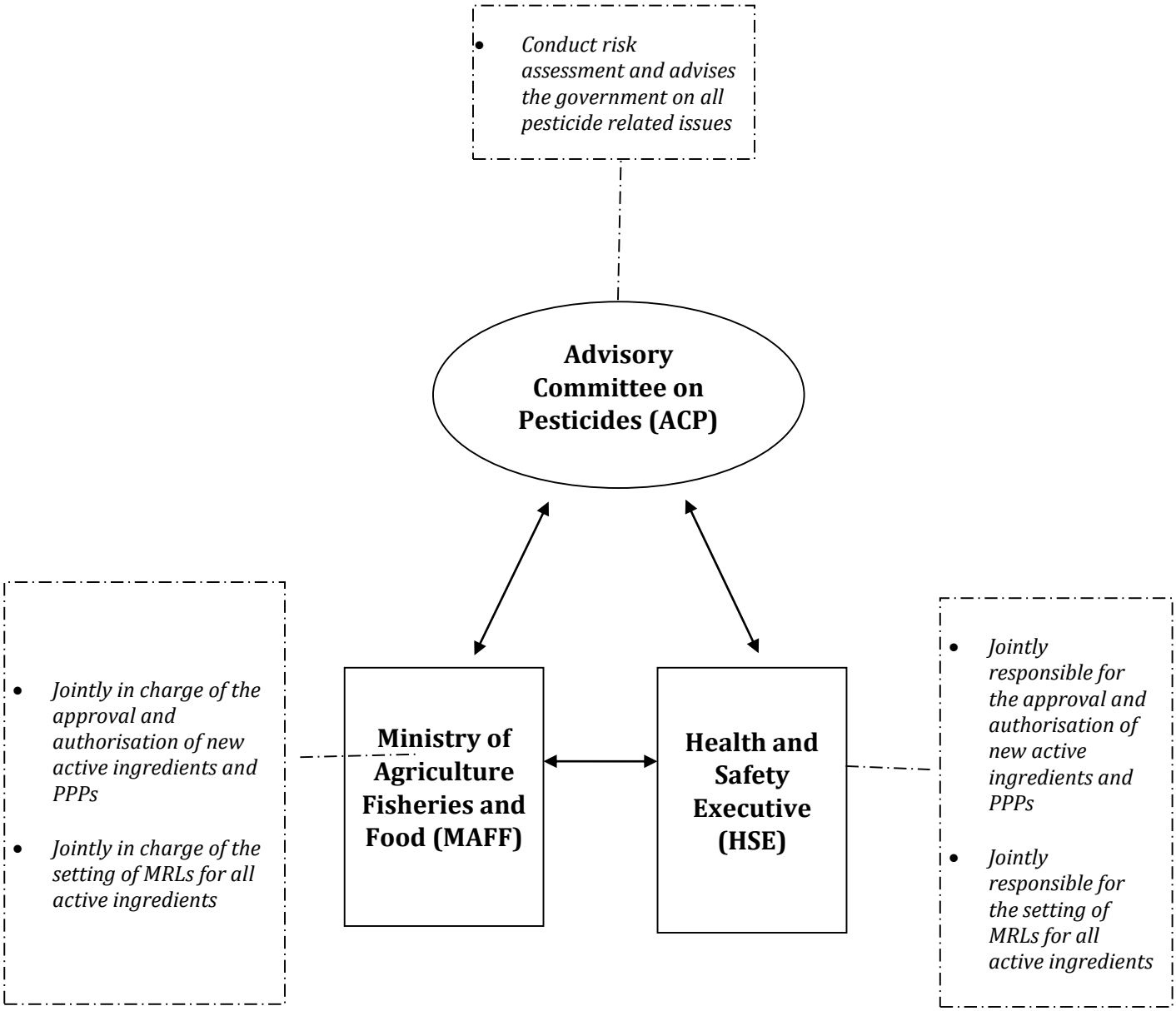
Another noticeable development in the domestic regulatory setup is the functional separation of risk assessment from risk management functions. In 1986, the ACP, which was in charge of pesticide risk assessment, was directly under the Ministers. The Ministers had the power to appoint and dismiss members of the committee. Additionally, the committee's activities, including meeting reports and minutes, were not readily available to the public. The shift in regulatory functions – such as the sharing of competence with the EC and EFSA – partly initiated reforms in the UK to conform with the EU's arrangement. The terms of reference of

[240] CXL is an MRL set by the Codex Alimentarius Commission

[241] S12, Interview, 20 Aug. 2020.

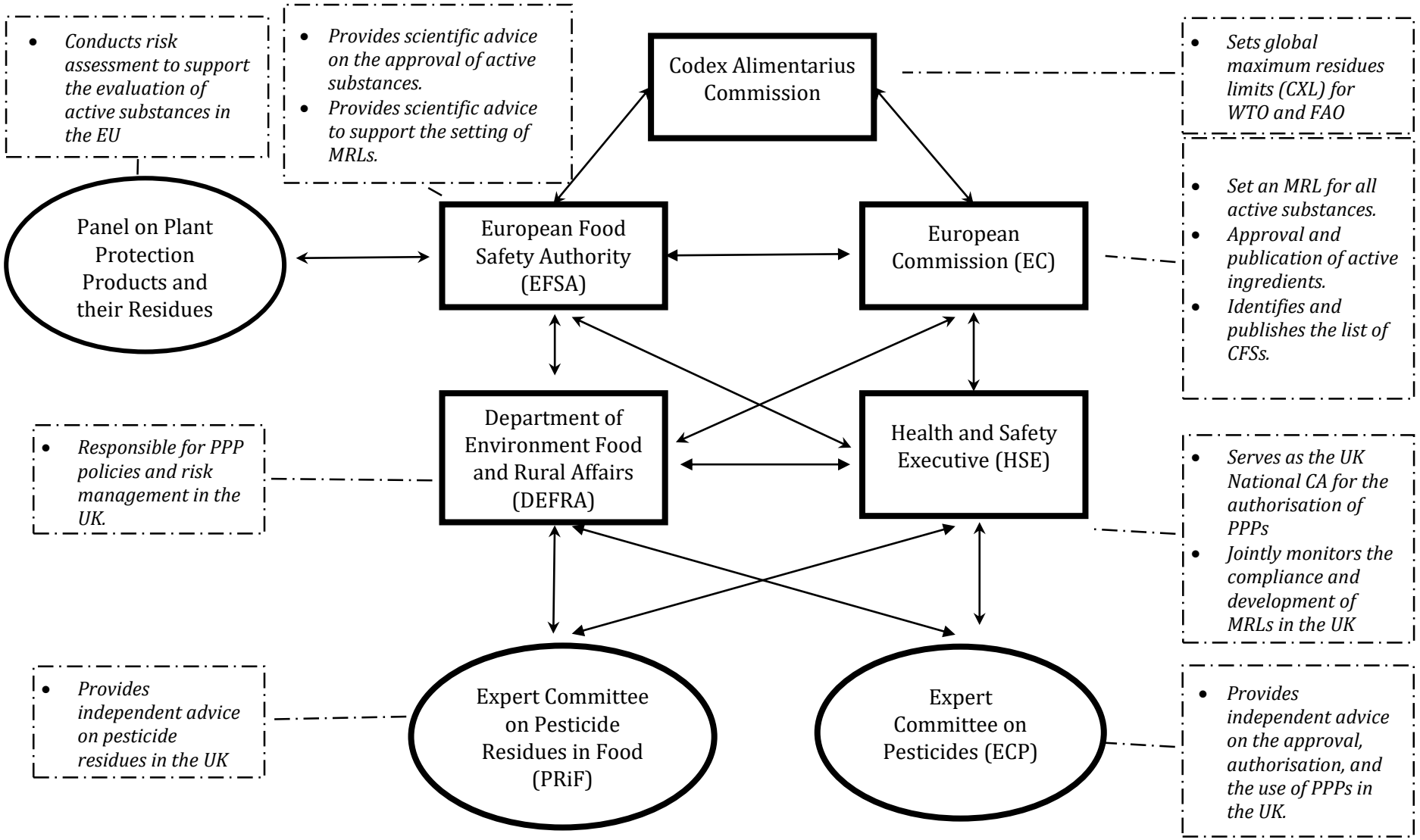
PRiF and ECP ordered them to operate independently from the risk managers – DEFRA and HSE.

Fig. 6.3: The Organisational Structure of UK's PPP Regulatory Regime as of 1986



Source: Developed by the Author

Figure 6.4: The Organisational Structure of UK's PPP Regulatory Regime at the end of 2016



Source: Developed by the Author

6.7.2 Policies

The discussion in section 5.6 shows a substantial shift in the UK's regulatory approach and policy strategies over recent decades. As illustrated in figure 5.2 above, the UK's PPP regulations moved progressively from voluntary measures to statutory controls. The UK was predominated by market-based and industry-led schemes relative to rule-based and prescriptive regulatory approaches (Gilbert, 1987). This became evident with the rejection of the 'Pesticide Bill' to maintain the voluntary PSPS procedures. The analysis shows that EU membership partly initiated the move toward statutory controls on pesticides in the UK. This began with the EU's Directive (76/895), which ordered all member states to set maximum residue limits for pesticides, and Council Directive 79/117/EEC prohibiting the use of PPPs containing certain active substances. The UK finally adopted FEPA and COPR, laying down the statutory procedures for approval, marketing, and use of PPPs.

Another noticeable development in the policy domain was the rise in volume, scope, and intensity of legislation originating from the EU. In the 1980s, most PPP rules were made at the national level. The EU's objective to have a harmonised regime led to an increase in the number of rules to cover all aspects of PPPs in the 1990s and 2000s. As of 2016, more than 90% of the UK's regulations on PPPs were either derived or came directly from the EU.[242] Moreover, before the 2000s, almost all EU rules relating to pesticides were in the form of Directives – which meant the UK had options to choose different policy strategies in achieving the policy goal. However, into the 2000s, all the Directives were replaced by Regulations – which meant the rules were to be implemented in their entirety without any manoeuvring.[243]

Also, the EU's PPP regulations progressively shifted towards a more precautionary and risk-averse outlook in the 2000s. This impression became evident in the adoption of the 'precautionary principle' as a legal specification for PPP approval and authorisation under

[242] See Pesticide Legislations originating from the EU. https://www.legislation.gov.uk/eu-origin/1986-2020?text=Pesticide

[243] See Pesticide Legislations originating from the EU. Cit. Loc. n. 162 above

Regulation 1107/2009. The EU's decision (Regulation (EU) 485/2013) to restrict neonicotinoids in 2013 was based mainly on the precautionary principle.[244] Jacqueline McGlade, the then-Executive Director of the European Environmental Agency, explained that:

> *'…based on the body of evidence, we can see that it is absolutely correct to take a precautionary approach and ban these chemicals [neonicotinoids].'*[245]

The UK, however, opposed and voted against the restrictions for lack of 'sound' evidence. As detailed in the Government Response to the Environmental Audit Committee's Session on Pollinators and Pesticides:

> *'The Government's view of the current evidence is outlined in our response…We do not consider that the evidence points to unacceptable risks to bees. We do not, therefore, consider that it supports the course of action proposed by the Committee. For the same reason, we voted against the very similar proposal made by the Commission and now in place as Commission Implementing Regulation (EU) 485/2013. Nevertheless, as previously discussed, the Commission have [sic] adopted the proposals and we will implement them in full. We are considering what part the UK Government can usefully play in building a widely-supported evidence base in time for a review of restrictions...'*[246]

6.7.3 Politics

The overall changes in the organisational structure and policy styles also affected the norms, processes, and dynamics of interactions among domestic actors in the regime. First, because of the top-down organisational structure that emerged in the 2000s, local actors explored ways

[244] EEA (2013). Neonicotinoid pesticides are a huge risk – so a ban is welcome. News. Accessed from https://www.eea.europa.eu/highlights/neonicotinoid-pesticides-are-a-huge
[245] EEA (2013). Loc. Cit. no. 244 above.
[246] House of Commons (2013). Pollinators and Pesticides: Government Response to the Committee's Seventh Report of Session 2012-13 - Environmental Audit Committee

to lobby and influence decisions at the EU level. For instance, the Pesticide Action Network (PAN) joined other European environmental groups to solicit signatures across Member States to petition the EC through the European Citizens' Initiative (ECI)[247] to set EU-wide mandatory reduction targets for pesticide use. Other environmental NGOs such as Friends of the Earth (FoE) and Greenpeace reported the UK government to the European Commission for non-compliance with EU's pesticide rules.[248] In some instances, environmental groups took legal action instead of complaints. For example, in 2015, FoE launched a legal challenge against the government's decision to allow some farmers to use neonicotinoids on oilseed rape – which had been banned by the EU.[249]

Also, because all Member States influenced EU regulations, the UK downloaded norms and procedures that other countries have uploaded. An example is the use of a precautionary approach and hazard-based regulatory approach, which played out in the restrictions of neonicotinoid pesticides. In the late 1990s, France began to initiate restrictions on neonicotinoid products after preliminary monitoring studies on their effect on bees. In the 2000s, other member states such as Italy, Germany, and Slovenia followed France's example to restrict these products. However, the UK maintained its preference for a risk-based regulatory approach.[250] As implied from a statement by DEFRA:

> *'We already know that there are risks if a product isn't used correctly…We have a robust system for assessing risks from pesticides in the UK that is based on evidence - and current evidence shows that there is not an unacceptable risk to bee health from these [neonicotinoid] products.'*[251]

[247] See European Commission (2016). Commission registers two new European Citizens' Initiatives**.** News. 23 September 2016. https://ec.europa.eu/newsroom/home/items/34044/

[248] The Guardian (25 Aug. 2015). Government permission to use banned pesticides face a legal challenge. Accessed from https://www.theguardian.com/environment/2015/aug/25/government-permission-to-use-banned-pesticides-face-legal-challenge.

[249] The Guardian (25 Aug. 2015). Cit. Loc. No. 248 above.

[250] Risk-based regulatory approach focuses on managing the 'exposure' to harm, danger, or loss, whereas the hazard-based regulatory approach focuses on regulating products or activities that can cause harm or danger.

[251] See DEFRA (2011). Risk of pesticides to bees: myths busted. Press Release. 7 January 2011. https://www.gov.uk/government/news/risk-of-pesticides-to-bees-myths-busted

The EU adopted the hazard-based precautionary approach to initiate EU-wide restrictions on neonicotinoids, which were eventually accepted in the UK.

6.7.4 Conclusion

The ongoing analysis confirms a substantial adjustment in the UK domestic PPP regulatory regime, especially within the past three decades. One significant development was the delegation of a sizeable number of regulatory functions to EU institutions and agencies. There has also been a systematic separation of risk assessment functions from risk management in the regime. In terms of policies, there has been a substantial increase in legislation from the EU. This development also affected the UK PPP regulatory policy styles – moving from voluntary market-based schemes to statutory controls.

The analysis demonstrates that EU membership and the passage of the Single European Act (SEA) have been the main sources of changes in the UK's domestic PPP regulatory regime despite the UK being among the first countries in the world to have clear-cut regulatory schemes for the marketing and use of PPPs – the Pesticides Safety Precautions Scheme (PSPS). In the 1960s, the UK had already established an advisory committee that advised the government on pesticide-related issues; however, it maintained voluntary schemes until the 1980s. Thus, even though the UK already had the regulatory structures for PPP governance, the adoption of statutory control measures by the EU put substantial adaptational pressure on the UK. Additionally, the UK had a propensity for practical risk-based regulatory measures; however, the adoption of a hazard-based precautionary approach by other member states and the EU compelled the UK to also adopt the latter.

6.8 Chapter Summary and Conclusion

The broad objective of this chapter was to analyse the historical development of advisory and regulatory structures for agri-food governance in the UK, with emphasis on the impacts of EU membership. The chapter highlighted the critical junctures, including the factors that led to the formation of new institutions and those that triggered institutional changes in each of the selected regimes. It showed that there had been a significant transformation in the advisory and regulatory structures across all the selected regimes over the past decades. The analysis indicated that the institutional changes and the reforms were driven conjointly by internal factors and as an outcome of EU membership.

Further, the chapter showed that crises have primarily driven the UK's internal regulatory reforms and institutional change. From the emergence of AMR genes in the 1960s to the BSE outbreak in the 1990s, crises created the atmosphere for discourse and eventually led to institutional changes. The UK established expert advisory bodies within all the regimes to respond to particular situations. The expert groups were to provide advice to governments to make proactive policy decisions. However, before the 2000s, most of these groups operated under the discretion of the Ministers. The James Report and the Phillips Inquiry provided the rationale for expert advisory groups to operate at ‘arm’s length’ from the government and be open and transparent to the public.

Following the Single European Act in 1986, the EU resorted to policies and measures to harmonise regulatory standards to ensure the smooth operation of the single market. In the 1980s and the 1990s, the EU delivered this policy objective through directives, such as harmonising the approval regime and setting residue limits for pesticides and veterinary medicines. However, the spatial spread of the BSE outbreak and other food safety scares in the 1990s and the disjointed policy response from EU Member States provided the basis to move toward a more centralised regime. In 2002, the EU passed the General Food Law – which marked the beginning of the move towards a more centralised agri-food regulatory

system. The legislation established the EFSA as ‘an independent scientific point of reference’ and the hub connecting all national advisory bodies.

The chapter demonstrated that the expansion of the EU’s regulatory activities influenced UK’s domestic regimes to a varying degree. As summarised in Table 5.1 below, evidence of Europeanisation can be seen in the food safety regime, with the transfer of a significant amount of regulatory functions from the UK’s regulatory bodies, FSA and DEFRA, to EU agencies – EFSA and the European Commission. There has also been an increase in food safety regulations originating from the EU. The formal and informal network channels created due to the regulatory harmonisation have also caused UK actors to incorporate EU ideas, norms and practices into domestic discourse. However, the analysis confirms that the degree of Europeanisation in the food safety regulatory regime was ‘low’. This was due to the weak adaptational pressure (strong degree of fit) caused by the BSE crisis and the subsequent reforms initiated in the UK. The EU reforms essentially replicated the UK’s model, and as a result, the degree of fit between the two was already strong. Moreover, the BSE crisis had caused the UK public to lose trust and confidence in domestic institutions. Hence, there was little resistance to transferring regulatory competence to EU agencies.

The analysis showed that the process of Europeanisation was not the same between the animal welfare and veterinary medicines regulatory regimes. The degree of fit was strong for the animal welfare regulatory regime because the UK uploaded most of its standards to the EU. Also, the UK already had in place the organisational structures, so it only absorbed new EU rules without making substantial institutional adjustments. The degree of Europeanisation was, therefore, ‘low’. However, regarding veterinary medicines, the UK had a divergent policy outlook (preference for voluntary and market-based measures) compared to the rule-based policy style that was emerging in the EU. Thus, although the UK had a similar organisational structure to the EU, it had to change its policy regime to fit into the reforms. Therefore, the degree of Europeanisation was ‘moderate’.

Lastly, evidence of Europeanisation can be observed in the PPP regulatory regime, with the shift from a nationalised to a two-tier approval and authorisation system. There was also the formation of formal and informal governance networks with the EU as a centre point. However, the emergence of divergent policy styles between the UK and the EU created a high mismatch and strong adaptational pressure. The UK had historically preferred voluntary and industry-led regulatory schemes compared to the rule-based measures emerging from the EU. It also had a strong propensity for risk-based approaches compared to the hazard-based precautionary measures that the EU adopted. Eventually, the UK had to change its policy style to accommodate the EU policy approach without substantial institutional adjustments. The degree of Europeanisation was, therefore, 'moderate'.

In conclusion, the chapter demonstrated that EU membership and decades of harmonisation considerably impacted agri-food regulatory governance processes in the UK. In terms of polity, UK agencies became members of a broader EU-wide regulatory network, where EU agencies served as a hub. The UK needed to change its policy styles and regulatory culture in some key areas to align with the new EU's direction from a policy perspective. Moreover, the interaction and socialisation of UK actors with actors from other member states led to the cross-loading and downloading of EU principles, ideas, and practices into the UK's regulatory domains. However, the degree of Europeanisation and adaptional pressure for all the regimes was not as high as anticipated or suggested from studies in other areas such as the environment (*see* Burns et. al. 2019).

Table 6.1: Europeanisation of the UK's agri-food regulatory regimes

	Process/Evidence of Europeanisation	Mediating/Constraining Factors	Adaptational Pressure	Degree of Europeanisation
The Food Safety Regime	● Delegation of a large sum of risk assessment, evaluation, and authorisation functions from FSA to EFSA. ● Delegation of a large sum of risk management and decision-making functions from DEFRA and FSA to the EC. ● An increase in scope and number of food safety legislation originating from the EU. ● Formation of formal and informal institutional networks with the EU as the centre point. ● Adoption of EU ideas, norms and policy styles. ● Incorporation of ideas and norms of EU and other member states into domestic discourse.	● Existence of a similar organisational framework. ● BSE Crisis and the loss of public trust in domestic institutions. ● The emergence of a similar policy outlook.	● Weak	**Absorption**: The UK incorporated new EU food safety policies without modifying the existing institutional framework or policy style substantially. The degree of domestic change or Europeanisation is ***Low.***
The AHAW Regulatory Regime	● A shift from a nationalised approval and authorisation regime to a two-tier system. ● Creation of formal and informal governance networks, with EU institutions as the hub. ● An increase in scope and amount of EU legislation in the regime. ● Incorporation of ideas and policy options from the EU and other member states into domestic discourse.	**Animal Welfare** ● Existence of similar regulatory structures ● The emergence of a similar policy outlook	**Animal Welfare** ● Weak	**Animal Welfare** **Absorption**: The UK influenced most of the EU's animal welfare regulations. Thus, the UK needed not to make any substantial institutional adjustments to incorporate new EU animal welfare policies.

		<u>Veterinary Medicines</u> ● Existence of similar regulatory structures ● Existence of divergent policy outlooks	**<u>Veterinary Medicines</u>** ● Strong	The degree of domestic change or Europeanisation was ***Low.*** **<u>Veterinary Medicines</u>** **Accommodation**: The UK had a different policy preference (voluntary and market-based measures) than the EU (legal controls). Thus, 'policy misfit' was high. However, the UK already had a similar organisational structure for veterinary medicines regulations as the EU. Therefore, it needed to change the policy regime but not the organisational structure. The degree of domestic change or Europeanisation was ***Moderate.***
The PPP Regulatory Regime	● A shift from nationalised approval and authorisation regime to a two-tier system. ● Creation of formal and informal governance networks, with EU institutions serving as the hub. ● An increase in scope and amount of food safety legislation originating from the EU. ● Adoption of EU ideas, norms and policy styles. ● Incorporation of ideas and norms of EU and other member states into domestic discourse.	● Existence of similar regulatory structures ● The emergence of divergent policy styles	● Strong	**Accommodation**: There was a 'high' mismatch in regulatory approaches (risk-based vs hazard-based). However, there existed a similar organisational structure for risk governance. Therefore, the UK accommodated the EU policy approach without substantial organisational rearrangement. The degree of domestic change or Europeanisation was ***Moderate.***

Source: Developed by the Author

CHAPTER SEVEN: POST-BREXIT AGRI-FOOD REGULATORY GOVERNANCE IN THE UK

7.1 Introduction

This chapter addresses the second objective of the dissertation – it analyses the implications of Brexit on prospective agri-food regulatory regimes in the UK. Specifically, it presents empirical findings on the opportunities and challenges the post-Brexit legal framework and EU-UK trade agreements offer the UK to diverge or align with the EU's agri-food regulatory standards. The chapter connects with the preceding chapter (Chapter five) to discuss the impacts of Europeanisation on actor preferences, domestic institutional structures, and how they will play out in the UK's decision to align or diverge from EU standards. It also discusses the influence of external factors, such as trade agreements with third countries and how they will all come together to affect the dismantling decisions in the UK. Finally, it predicts the possible outcome or effects of dismantling each of the selected issues.

After this introductory section, the following sections are grouped into two main parts. The first part focuses on the legal and procedural arrangements for post-Brexit trade and economic relations between the EU and the UK. Specifically, it analyses the essence of the European Union Withdrawal Act (EUWA), the Northern Ireland (NI) Protocol, and the EU-UK TCA for the post-Brexit agri-food sector in the UK. The second part assesses the challenges and opportunities for dismantling the EU's regulatory policies focusing on the selected cases: the chemical PRT ban, the restrictions on antibiotics, and the ban on neonicotinoids. It discusses the perspectives of stakeholders, internal and external opportunities, and constraints to the dismantling of each of the selected issues. The last section presents the summary and conclusion of the chapter concerning the implications of the new EU-UK relationships for agri-food regulatory governance in the UK.

Part I: THE ESSENCE OF THE UK-EU AGREEMENTS FOR THE AGRI-FOOD SECTOR

'Recognising the Parties' [UK AND EU] respective autonomy and rights to regulate within their territories in order to achieve legitimate public policy objectives such as the protection and promotion of public health…safety, the environment including climate change…noting that the United Kingdom withdrew from the European Union and that with effect from 1 January 2021, the United Kingdom is an independent coastal State with corresponding rights and obligations under international law…This Agreement establishes the basis for a broad relationship between the Parties…characterised by close and peaceful relations based on cooperation, respectful of the Parties' autonomy and sovereignty.' – (The EU-UK TCA, 2020)

7.2 The Legal Framework and Procedural Arrangements for Future UK-EU Relations

Following the Brexit referendum in 2016, the UK began withdrawing from the EU governance arrangements and started to negotiate agreements for the future relationship between the two territories. The process started with the passage of the European Union Withdrawal Act (EUWA) 2018, which provided the legal basis for future UK relations with EU regulations and institutions. The Northern Ireland (NI) Protocol was also adopted as part of the EUWA to ensure a no 'hard border' relation between NI and the Republic of Ireland (which is still a member of the EU). Finally, the UK and the EU agreed on a new Trade and Cooperation Agreement (UK-EU TCA), establishing the basis for free trade and other socio-political cooperation between the two blocs. This section analyses the key components of these arrangements and their implications for the post-Brexit agri-food sector in the UK.

7.2.1 The European Union Withdrawal Act (EUWA)

The European Union Withdrawal Act (EUWA) 2018 was passed on 26th June 2018 to repeal the European Communities Act (ECA) 1972[252] and make legal provisions for the withdrawal of the UK from the EU. By repealing ECA, the EUWA ended the supremacy of EU laws, rules, principles, and institutions on the UK's domestic regulatory processes. This means the UK was no longer bound by rules and regulations made by EU departments and agencies from 31st December 2020 (the exit day). Additionally, all regulatory and policy arrangements made under the ECA – including the regulatory requirements under the Common Agricultural Policy (CAP), the authority of EFSA as the lead risk assessor, and the role of the Court of Justice of the European Union as the principal interpreter of EU laws – ceased to apply in the UK.

However, the EUWA converted all legislation that originated from the EU before the exit day, both direct and derived, into UK domestic laws. This implies that all the EU regulations, directives and decisions discussed in chapter five continue to apply in the UK. However, there may be some substantial changes in the organisational framework for the implementation of the retained laws. For instance, when a retained law confers regulatory authority to an EU agency, the EUWA calls on a Minister of the Crown to consider an appropriate remedy – either transferring the regulatory competence to a corresponding domestic agency or establishing a new one.[253] Also, the EUWA entrusts the responsibility for interpreting the retained EU laws solely to UK courts. As provided in section 26 of the Act:

> *'…A [UK] court or tribunal…is not bound by any principles laid down, or any decisions made, on or after exit day by the European Court, and cannot refer any matter to the European Court on or after exit day'.*[254]

[252] The European Communities Act 1972 was an Act which made legal provisions for the accession of the United Kingdom to the EU.
[253] *See* Section 8 of the EUWA
[254] *See* Section 26 of the EUWA

Moreover, the EUWA does not restrict the UK from interacting with EU laws and agencies in the future. As given in Section 19:

> *'Nothing in this Act [EUWA] shall prevent the United Kingdom from replicating in domestic law any EU law made on or after exit day, or continuing to participate in, or have a formal relationship with, the agencies of the EU after exit day'.*[255]

7.2.2 The Northern Ireland (NI) Protocol

As part of the EUWA, the Northern Ireland (NI) Protocol was also designed as an official agreement to govern the complex border relations between Northern Ireland (NI), the Republic of Ireland (ROI), and Great Britain (GB). Removing the 'hard border' between NI and ROI had been a crucial element in the 1998 Good Friday (or Belfast) Agreement – which ended the over three-decade-long conflict in NI popularly referred to as 'the Troubles'. The borderless arrangement was not difficult to manage since both NI and ROI were members of the EU – which meant they were all under a single regulatory regime and operated in a Common Travel Area. However, the UK's decision to leave the EU's Single Market (following the Brexit referendum) presented a customs border between NI (which is part of the UK) and ROI (which is part of the EU). Moreover, the UK did not also want a border in the Irish Sea between NI and GB for economic and socio-political reasons.[256] This puzzle, referred to as the 'Brexit Trilemma',[257] dominated the post-referendum discussions.[258]

After months of intense public debates, the NI Protocol was agreed on in December 2020 to address the challenge. Under the Protocol, the whole UK, including NI, leaves the EU Customs

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[255] See Section 19 of the EUWA.

[256] The Guardian (16 Aug. 2019). The 'Irish Sea border': what does it mean for GB business? https://www.theguardian.com/politics/2019/oct/16/the-irish-sea-border-what-does-it-mean-for-businesses-brexit

[257] The 'Brexit Trilemma' emanated from three competing objectives: Withdrawal of the UK from the EU Single Market and Customs Union, no hard border on the island of Ireland, and no customs border in the Irish Sea. It is not possible to have all three.

[258] The Guardian (20 Aug. 2019). Brexit: EU unconvinced by Johnson's fresh bid to remove backstop. https://www.theguardian.com/politics/2019/aug/19/eu-unconvinced-as-boris-johnson-sets-out-fresh-bid-to-remove-brexit-backstop

Union as a single customs territory, but Northern Ireland would remain under the EU Single Market regime. The protocol specifies that there shall be no customs duties on goods moving from other parts of the UK into NI unless that good is at risk of moving directly (wholly) or indirectly (as part of another product) into the EU market. Every good entering the NI market is considered at risk of moving into the EU unless it is established that the product will not undergo any commercial processing in NI and fulfil some criteria established by the Joint Committee.[259] The final destination, the use, the value of a product, and the nature of its movement are the main factors the Joint Committee considers in deciding the 'riskiness' of goods.

Regarding trade agreements with third countries, the protocol affirms that NI goods shall have the same preferential access in third countries' markets as those produced in other parts of the UK. As given under Article 4:

> *'…nothing in this Protocol shall prevent the United Kingdom from including Northern Ireland in the territorial scope of any agreements it may conclude with third countries, provided that those agreements do not prejudice the application of this Protocol'.*[260]

Furthermore, the Protocol gives NI goods unfettered access to the rest of the UK internal market. Here, all products originating from NI to the GB market are allowed to be labelled as 'goods originating from the UK'. Also, goods placed in the NI market – including imports from the EU – and NI goods exported to the GB market are to follow UK laws. In cases where exports into the EU market require labelling, markings or tags of the originating Member State, NI goods must be labelled as 'UK(NI)' or 'United Kingdom (Northern Ireland)'. The Protocol obliged the UK and the EU to ensure smooth trade between NI and GB by avoiding controls at NI ports and airports. As expressed under Article 5:

> *'Having regard to Northern Ireland's integral place in the United Kingdom's internal market, the Union and the United Kingdom shall use their best endeavours to facilitate*

[259] See Article 6 of the NI protocol
[260] See Article 4 of the NI Protocol

the trade between Northern Ireland and other parts of the United Kingdom, in accordance with applicable legislation and taking into account their respective regulatory regimes as well as the implementation thereof.'

Moreover, UK authorities were given the responsibility for the implementation of applicable EU laws in NI. On the other side, EU authorities also have the right to request information concerning the implementation of EU legislation in NI. They can also ask UK authorities to carry out control measures on specific cases. The Protocol establishes a Joint Consultative Working Group, co-chaired by the UK and the EU, to serve as a forum for exchanging information and mutual consultation. Additionally, under the protocol, the Court of Justice of the European Union has jurisdiction over the interpretation of applicable EU laws in NI.

7.2.3 The EU-UK Trade and Cooperation Agreement (EU-UK TCA)

On 24 December 2020, the UK and the EU agreed on a new Trade and Cooperation Agreement (EU-UK TCA) to govern their future trading and socio-economic relationships. Central to the Agreement is the commitment to tariff-free and quota-free trade in all goods between the two blocs, provided they meet the 'rule of origin' conditions. The 'rule of origin' provision demands that products originating from a Party must be wholly obtained and produced from materials exclusively originating from that Party. However, if the product is processed and contains materials from a third country, the non-originating materials should not exceed a certain threshold.

The Agreement also allows the Parties to determine their approach to good regulatory practices and introduce Sanitary and Phytosanitary (SPS) measures to protect humans, animals, and plants from diseases, pests, and contaminants. The SPS measures apply to almost all agri-food products, including live animals, products of animal origin, animal feed, plants, and plant products. However, the TCA makes provisions to prevent and address scientifically unjustified use of the SPS measures. As specified under Article 73 of the Agreement:

'…each Party shall ensure that those procedures and related SPS measures: are initiated and completed without undue delay; do not include unnecessary, scientifically and technically unjustified or unduly burdensome information requests that might delay access to each other's markets; are not applied in a manner which would constitute arbitrary or unjustifiable discrimination against the other Party's entire territory.'

Furthermore, each Party is obliged to enhance mutual understanding and exchange information concerning the development of SPS measures, including the emergence and progress of new scientific evidence. Here, suppose an importing Party considers a severe risk to human, animal or plant life and health, it may take the necessary measures to protect human, animal or plant life and health without prior notification. The TCA establishes a Trade Specialised Committee on Sanitary and Phytosanitary Measures that monitors and supervises the implementation and use of all trade-related SPS measures. The Committee is tasked to regularly review SPS measures, exchange views and information, and address any SPS issue between the Parties.

Moreover, since the UK is no longer part of the EU single market and the customs union, all goods moving across the borders are subject to customs formalities and checks. These checks and controls may lead to more red tape, border delays, and variations in EU-UK supply chains. Therefore, the TCA includes customs facilitation measures to ease trade in goods through cooperation and simplified and modernised customs procedures. The TCA encourages the parties to adopt a risk management system based on appropriate selectivity criteria to minimise the threat to human, animal, or plant health. It also implores both parties to design and apply their systems 'to avoid arbitrary or unjustifiable discrimination or disguised restrictions on international trade.'[261]

The Agreement also makes provisions for a 'Level Playing Field (LPF)' for competition, subsidies, taxation, environment and climate, and trade and sustainable development. The LPF was one of the most contentious subjects during the Brexit negotiations. The EU argued

[261] See Article SPS.5 of the UK-EU TCA

that a tariff-free and quota-free trade agreement ought to be underpinned by strict conditions on fair competition with a standard dispute resolution mechanism. The UK supported the idea of fair competition and high standards but stood against legislative commitments that would have tied it to the Court of Justice of the European Union (CJEU).[262] The negotiation resulted in the LPF for labour and social standards, environment, and climate with a non-regression clause.[263]

Concerning state aid, the Agreement requires each Party to have an effective subsidy control system to ensure that subsidies address a specific market failure and do not have material effects on trade or investment between the Parties. An exception is made for subsidies on international cooperation projects that have cross-border spillover effects and those aim at enhancing environmental protection. Here, both parties are required to establish an independent body to manage their respective subsidy regime and cooperate on issues of common interest. Additionally, the Parties must be transparent about the subsidies they grant – publicly declare the legal basis and policy objective or purpose of each subsidy and the duration or the time limits attached to the subsidies.[264] The TCA includes a reciprocal mechanism that allows each party to take rapid action where a subsidy granted by the other Party is causing significant harm to its industries.[265]

In the areas of environment and climate change, the TCA requires both parties to maintain a high level of nature and biodiversity conservation and minimise environmental risks associated with agri-food-related activities.[266] Here, the Agreement affirms the right of each Party to set its policies and priorities according to its domestic rules and international commitments. However, the non-regression clause is established to ensure none of the parties

[262] *See* HM Government (2020). *The Future Relationship with the EU: The UK's Approach to Negotiations* *https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/868874/The_Future_Relationship_with_the_EU.pdf*

[263] Clause which prevents either party from reducing or weakening their own levels of protection at the end of the transition period in a manner "affecting trade or investment" between the two parties.

[264] See Article 369 of the UK-EU TCA.

[265] See Article 374 of the UK-EU TCA.

[266] See Article 390 of the UK-EU TCA.

lowers their environmental standards below the level when the UK officially left the EU. As given in Article 391:

> *'A Party shall not weaken or reduce, in a manner affecting trade or investment between the Parties, its environmental levels of protection or its climate level of protection below the levels that are in place at the end of the transition period, including by failing to effectively enforce its environmental law or climate level of protection'.*

Moreover, the Agreement affirms the use of the precautionary approach in situations where there are reasonable grounds for concern of irreversible damage to the environment or human health, but where there is no scientific certainty. The TCA permits the Parties to adopt appropriate measures to prevent such damage unilaterally.[267] It also includes a 'rebalancing clause', which allows either party to take action to rebalance the agreement where serious divergences in environmental standards create material impacts on trade or investment or there is a breach of the non-regression clause. This could take the form of temporary tariff impositions, sanctions, or cross-sector retaliation. As given in Article 411 of the TCA:

> *'The Parties recognise the right of each Party to determine its future policies and priorities with respect to labour and social, environmental or climate protection, or with respect to subsidy control…[However] If material impacts on trade or investment between the Parties are arising as a result of significant divergences between the Parties…either Party may take appropriate rebalancing measures to address the situation.'*[268]

Furthermore, the Agreement offers the UK the opportunity to participate in some EU research programmes as a third country subject to its financial contributions and fair treatment of research participants.[269] The financial contributions would be calculated based on the Gross Domestic Product (GDP) of the UK to the GDP of the EU. The Agreement also requires the

[267] Article 356 of the UK-EU TCA
[268] See Article 411 of the UK-EU TCA
[269] See Article 411 of the UK-EU TCA

UK to make provisions in its domestic laws, to facilitate the entry and the stay of people involved in implementing these joint programmes. Moreover, the EU has a mandate to unilaterally suspend the UK from its research programmes if it fails to make its financial contributions or introduces significant changes to the conditions stated in the TCA or adopted before the programme began.

Part II: ASSESSING THE POSSIBILITIES OF DE-EUROPEANISATION

'We have taken back control of every jot and title of our regulation. In a way that is complete and unfettered. From January 1, we are outside the customs union and outside the single market. British laws will be made solely by the British Parliament…We will be able to set our own standards, to innovate in the way that we want, to originate new frameworks... We will be able to cherish our landscape and our environment in the way we choose. Backing our farmers and backing British food and agricultural production'. – Boris Johnson (UK's Prime Minister)[270]

7.3 Opportunities and Challenges for Agri-food Regulatory Policy Dismantling

Brexit and the new EU-UK bilateral arrangements (explained in section 6.2.3 above) usher the UK's agri-food regulatory regimes into a new direction with numerous possibilities. First, the EUWA (2018) saves and retains all derived and direct EU agri-food legislation as domestic laws. It also allows the UK to align or copy any future EU regulations. The EU-UK TCA also offers the UK the scope to align with future EU policies and programmes. Moreover, both the EUWA and the EU-UK TCA recognise the UK's sovereignty and its autonomy to diverge from the EU's regulatory paths. Using the selected regulatory issues – the PRT ban, the restrictions on antibiotics, and the Neonicotinoids ban – as case studies, the following sections analyse the opportunities and challenges that exist for the different regulatory pathways and the

[270] Prime Minister's Office (2020). Prime Minister's statement on EU negotiations: 24 December 2020. Speech. https://www.gov.uk/government/speeches/prime-ministers-statement-on-eu-negotiations-24-december-2020

sustainability of the post-Brexit agri-food sector. Each section pays critical attention to the perspectives of the key stakeholders in the agri-food sector, the existing organisational and institutional framework, the Brussels effect and global opportunities and constraints to each of the selected issues. Each section also discusses the possible strategies, outcomes, or effects of dismantling for the cases studied.

Case Study I: The Ban on Pathogen Reduction Treatments (PRTs)

'Agriculture in the US remains quite backward in many respects…Whereas we have a 'farm to fork' approach to managing disease and contamination risk throughout the supply chain through good husbandry, the US is more inclined to simply treat contamination of its meat at the end with a chlorine or similar wash.' - George Eustice (Secretary of State for Environment, Food and Rural Affairs)[271]

'You have been presented with a false choice. Either stick to EU directives or find yourselves flooded with American food of the lowest quality. Inflammatory and misleading terms like "chlorinated chicken" and hormone beef are deployed to cast American farming in the worst possible light. It is time the myths are called out for what they really are. A smear campaign from people with their own protectionist agenda.' Woody Johnson (US Ambassador to the UK)[272]

7.4 A Brief Overview

Leaving the Single Market – guided by one of the most stringent food safety regulations – there have been concerns about the possibility of the UK lowering its food safety standards to facilitate free trade arrangements with third countries. The ongoing UK-US trade negotiations

[271] The Guardian (06 Mar. 2019). Britain urged to reject 'backward' US food safety standards. https://www.theguardian.com/politics/2019/mar/06/britain-urged-to-reject-backward-us-food-safety-standards

[272] The Guardian (02 Mar. 2019). US ambassador to the UK under fire over the defence of chlorinated chicken. https://www.theguardian.com/politics/2019/mar/02/us-ambassador-to-uk-woody-johnson-under-fire-over-defence-of-chlorinated-chicken-post-brexit-jay-rayner

inflamed these concerns because of the differences in the food safety regulatory approaches between the EU and the US. One issue that typifies this contention is the possible import of 'chlorine-washed' or 'chlorinated' chicken from the US into the UK.[273] Following the retained EU laws,[274] chlorine water and all other chemical PRTs in domestic and imported poultry production are prohibited in the UK. However, the UK has the mandate to dismantle these regulations if it desires to facilitate trade with third countries.

In its negotiating objectives, the US expressed the desire to:

> *'…secure comprehensive market access for U.S. agricultural goods in the UK by reducing or eliminating tariffs…provide reasonable adjustment periods for U.S. import-sensitive agricultural products…eliminate practices that unfairly decrease U.S. market access opportunities or distort agricultural markets to the detriment of the United States, including non-tariff barriers that discriminate against U.S. agricultural goods; and….promote greater regulatory compatibility to reduce burdens associated with unnecessary differences in regulations and standards, including through regulatory cooperation where appropriate.'*[275]

Elaborating on these objectives, the US Ambassador to the UK, Woody Johnson, described the UK's fears over chlorine-washed chicken as 'myths' and urged them to embrace US farming methods.[276] Furthermore, when the then UK's Secretary of State for International Trade, Liam Fox, met the International Trade Committee, he stated that:

> *'There are no health reasons why you couldn't eat chlorinated chicken. Most of the salads in our supermarkets are rinsed in chlorinated water, and in terms of reduction of Campylobacter food poisoning, the US has in general much lower levels of Campylobacter food poisoning than most countries in Europe…I have no objection to*

[273] *See* BBC News (5 Mar. 2019). Chlorinated chicken: How safe is it?
[274] *See* Regulation (EC) No 853/2004 and EUWA 2019.
[275] See USTR (2019).'United States-United Kingdom Negotiations'. Summary of Specific Negotiating Objectives. https://ustr.gov/sites/default/files/Summary_of_U.S.-UK_Negotiating_Objectives.pdf
[276] The Guardian (5 Mar. 2019). Cit. Loc. No. n. 273 above

the British public being sold anything that's safe as long as they know what they're eating'[277]

The preceding discussions affirm the possibilities of dismantling the existing chemical PRTs ban in the UK. However, dismantling also means diverging from EU food safety standards in this instance. Given the NI Protocol and the EU-UK TCA, this section and the subsequent sub-sections discuss the challenges and opportunities of dismantling or divergence from EU's PRT regulations and the probable effect on the post-Brexit agri-food governance in the UK.

7.4.1 Stakeholders' Perspectives

A regulatory decision to maintain or dismantle the PRT ban will have a substantial impact on domestic actors across the agri-food value chain. Correspondingly, the interests and preferences of these actors have a considerable influence on the regulatory policy decision-making process. Here, the thesis analyses the views and perspectives of a selection of UK domestic stakeholder groups concerning the UK-US trade negotiations, the probable importation of 'chlorinated chicken', the potential impacts and the possibility of dismantling the restrictions on PRTs.

The initial concerns about chemical PRTs were their potential risks to food safety and public health. This perception was fuelled by some media publications associating them with household bleaches.[278] Also, some chemical PRTs such as chlorine dioxide, acidified sodium chlorite, trisodium phosphate and peroxyacids were linked to the development of antimicrobial resistance. However, these claims were disputed by EFSA and some leading experts. For instance, the EFSA's scientific opinion in 2015 concluded that *'the exposure to chlorite*

[277] The Guardian (01 Nov. 2017). Liam Fox reopens the cabinet rift with a defence of chlorinated chicken.
[278] The Guardian (03 Jun. 2019). The Truth About Chlorinated Chicken review – an instant appetite-ruiner. https://www.theguardian.com/tv-and-radio/2019/jun/03/the-truth-about-chlorinated-chicken-review-an-instant-appetite-ruiner

residues arising from treated poultry carcasses would be of no safety concern'.[279] Further, in 2008, EFSA's panel on biological hazards affirmed that:

> *'…there are currently no published data to conclude that the application of chlorine dioxide, acidified sodium chlorite, trisodium phosphate or peroxyacids to remove microbial contamination of poultry carcasses at the proposed conditions of use will lead to resistance to therapeutic antimicrobials'.*[280]

In 2019, amidst the rising public fears around the post-Brexit trade deal with the US, the then-chief scientific advisor to DEFRA, Professor Ian Boyd, also argued:

> *'…from a health perspective there really isn't a problem with chlorinated chicken…the issue is about production processes and animal welfare, and that is a value-based choice that people need to make…But it is the job of people like me to make sure that we explain as clearly as possible what the consequences of different choices are for people.'*[281]

G1 from FSA, in an interview for this study, also added:

> *'As a government department that assesses risk, we are interested in two main things. First, is chlorine disinfectant harmful to human health? And the clear answer is no. Because the levels of chlorine we are talking about are marginal compared to many activities in our everyday lives. And then the second is, does chlorine disinfection reduce the number of pathogens on a chicken? Here, most of the evidence in that situation suggests that it is an effective treatment.'*[282]

[279] The EFSA Journal (2005). Treatment of poultry carcasses with chlorine dioxide, acidified sodium chlorite, trisodium phosphate and peroxyacids. 297, 1-27

[280] The EFSA Journal (2008). Assessment of the possible effect of the four antimicrobial treatment substances on the emergence of antimicrobial resistance. 659, 1-26

[281] Sky News (29 Aug. 2019). 'No health problems with chlorinated chicken - Govt's chief scientific adviser.' https://news.sky.com/story/no-health-problems-with-chlorinated-chicken-govts-chief-scientific-adviser-11796443

[282] G1, Interview, 14 Jun. 2020

The dominant view among the experts interviewed, and the major stakeholder groups in the UK is that chemical PRTs do not necessarily pose food safety risks. However, they may lead some actors to rely on them as decontaminants instead of adopting proper hygiene and healthy farmhouse practices such as low flock or stocking density, routine health monitoring and monitoring and proper handling of animals before slaughter. Thus, the UK stakeholder groups consider the overreliance on PRTs to be commensurate with lower animal welfare and farming standards. The EU/UK regulatory framework, on the other hand, is based on the farm-to-fork approach, which requires food producers and distributors to adhere to a series of high farming and production practices along the value chain to eliminate the risk of possible contamination.

The PRT regulations and trade negotiations with third countries have created an 'unusual alliance' among domestic stakeholder groups comprising food producers, distributors, consumer groups, and Civil Society Organisations (CSOs). They contend that allowing imports of chlorinated chicken and other low-standard agri-food products will put UK food producers at a competitive disadvantage. The argument is that the farm-to-fork approach adopted by the current EU/UK regime places extra regulatory costs on local farmers compared to imports that do not comply with such strict standards. As the President of the National Farmers' Union (NFU), Minette Batters argue:

> *'This isn't just about chlorinated chicken. This is about a wider principle. We must not tie the hands of British farmers to the highest rung of the standards ladder while waving through food imports which may not even reach the bottom rung…To sign up to a trade deal which results in opening our ports, shelves and fridges to food which would be illegal to produce here would not only be morally bankrupt, it would be the work of the insane.'*[283]

The Chief Executive of the British Poultry Council (BPC), Richard Griffiths, also added:

[283] BBC News (25 Feb. 2020). UK would be 'insane' to let in chlorinated chicken, farmers say. https://www.bbc.co.uk/news/business-51626525

> *'If food produced to lower standards is allowed to enter the British market, it will create a two-tier food system, in which only the affluent can afford to eat British food grown to British standards…Maintaining high British standards and continuing a healthy trading relationship with the EU is vital to UK food security. Government must not negotiate trade agreements that compromise Britain's competitiveness and risk the nation's access to a secure supply of safe, nutritious and affordable British food.'*[284]

Consumer groups in the UK have also supported the call to maintain the existing farm-to-fork food safety approach. In 2018, a survey carried out by the 'Which?'[285] consumer group among over 2000 UK adults showed that about 90% of consumers wanted the UK government to retain the current food standards after Brexit. 66% of the respondents also believed that food should not be imported from countries with lower standards, and 68% responded that they are not comfortable eating chlorine-washed chicken. The head of consumer protection and food policy of the Group, Sue Davies, added:

> *'People in Britain – whether rich or poor – are absolutely united in their opposition to lowering food standards and allowing imports of products like chlorine-washed chicken…into our supermarkets, schools, and hospitals. Food standards in the UK must not be compromised by any trade deal that would betray decades of progress on food safety, quality, and animal welfare.'*[286]

Moreover, most of the leading supermarkets in the UK, including Tesco, ASDA, Co-Op, Aldi, and Waitrose, have pledged to ban chlorine-treated chicken on their shelves regardless of any post-Brexit deal with third countries. As stated by Giles Hurley, the Chief Executive of Aldi:

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[284] BPC (20 May 2020). 'BPC Welcome George Eustice's Commitment to Maintain UK Standards in Trade Deals'. https://britishpoultry.org.uk/welcome-george-eustices-commitment-to-maintain-uk-standards-in-trade-deals/

[285] Which? (2019). 'Which? disagrees that fears around chlorinated chicken are 'unfounded'. https://www.which.co.uk/news/article/which-disagrees-that-fears-around-chlorinated-chicken-are-unfounded-a52dn5G9h0TP

[286] Which? (2020). 'Which? reveals consumer concern over trade deal threat to school and hospital food'. Press Office. https://press.which.co.uk/whichpressreleases/which-reveals-consumer-concern-over-trade-deal-threat-to-school-and-hospital-food/

'We will never compromise on the standards or specifications of our products, and that includes a commitment to never selling chlorinated chicken....'[287]

The Chief Executive of Tesco, Dave Lewis, also added:

'As a retailer, we will have to respect what people want…There is no US sourcing of chicken on my mind. Whatever the trade deals are, we, like other retailers, will look at them, but what we won't do is give up our standards.'[288]

Also, communicating to consumers in their Weekend magazine, the Chief Executive of Waitrose, James Bailey, endorsed the need to maintain UK food safety standards and their commitment to that goal. He emphasised that:

'…any regression from the standards we have pioneered for the last 30 years would be an unacceptable backwards step…It would be simply wrong to maintain high standards at home yet import food from overseas that has been produced to lower standards. We would be closing our eyes to a problem that exists in another part of the world and to animals who are out of our sight and our minds."[289]

7.4.2 Internal Institutional Drivers and Constraints

As discussed earlier in Chapter Four, the current EU/UK food safety regulatory regimes were principally formed based on the food safety crises that emerged towards the end of the 20th Century. Following the crisis, all the new food safety regulations, including the ban on PRT, were stringent and adopted the precautionary approach. Given that the UK has transposed all the EU food regulations into domestic law, it could be inferred that the legal framework for post-Brexit food safety governance will be naturally precautionary and stringent. In this regard,

[287] ALDI (2020). 'ALDI UK Commits to Never Selling Chlorinated Chicken or Hormone Injected Beef'. Business News. https://www.aldipresscentre.co.uk/business-news/aldi-uk-commits-to-never-selling-chlorinated-chicken-or-hormone-injected-beef/

[288] The Times (19 Sep.2019). 'Tesco rules out US chlorinated chicken'.

[289] BBC News (25 Jun. 2020) 'Waitrose will never stock chlorinated chicken, says boss'. https://www.bbc.co.uk/news/business-53179588

the new legal authority for the food safety regime will serve as a constraint to dismantling the PRT ban.

However, concerns have been expressed about the fragility of the new legal framework, especially concerning the role given to the Ministers of the Crown. As Sue Davies, the head of consumer protection and food policy of Which? argues:

> *'…the current status of food standards in UK law could easily be changed with limited Parliamentary scrutiny. It would be far too easy to permit imports of chlorinated chicken…at any stage…In order to maintain the UK's current high standards, the government should take the opportunity to proactively put its commitments into law…giving consumers and food producers reassurance that our hard-won food standards will never be on the table in trade negotiations.'*[290]

Also, the past developments in the agri-food sector, including the 1990s crises and the associated reforms, have strongly been embedded in the UK's socio-political and food governance discourse. These past legacies serve as a reference for prospective agri-food policies. As Sue Davies asserts:

> *'We have come a long way from the dark days of salmonella scares and BSE…We don't need to fall back on this end kind of process treatment… There is absolutely no need for compromise'*.[291]

S3, an expert in food policy and politics, also expressed that the management of the food safety risks resonates deeper in the minds of consumers, and as such, food safety issues play an important role in UK politics. He explains that:

> *'The BSE crisis contributed substantially to the defeat of the then Conservative government to the Blair government. And it seems this government has completely*

[290]Which? (2020). 'Which? Responds to Comments that Chlorinated Chicken is Already Banned'. Which? Press Office. https://press.which.co.uk/whichstatements/which-responds-to-comments-that-chlorinated-chicken-already-banned/

[291] CNBC (13 Jun. 2019). Chlorinated chicken: Poultry threat to US-UK trade deal post-Brexit. https://www.cnbc.com/2019/06/13/chlorinated-chicken-poultry-threat-to-us-uk-trade-deal-post-brexit.html

forgotten those [BSE] lessons… Any attempt to neglect the consumers' concerns about using chlorination as a route to free trade will be catastrophic for this government… Now, they are beginning to realise it… we have seen ministers reversing their early stance and promising future nirvana of ever-higher food standards'.[292]

Moreover, the organisational arrangements and the focus of the existing food safety regulatory regime serve as an enabling factor to maintain the PRT restrictions. First, the FSA five-year strategy (2022-2027) emulates the EU's farm-to-fork strategy to ensure all actors along the food supply chain meet their obligations and do the right thing for consumers. It reaffirms its commitment to *'…earn and maintain public trust…prioritise the "consumer interest above other interests"*.'[293] Further, the existing participatory and consumer-centred model promotes incorporating societal norms and stakeholder preferences into food policies. Thus, all the public sentiments about 'chlorinated chicken' will be regarded as 'other consumer interests' in prospective trade and food policies.

7.4.3 The Brussels Effect

A decision to dismantle the PRT regulations will considerably affect the trade relations between the UK and the EU. This is because the EU operates quite a stringent regulatory regime for the use of PRTs – requiring both local and imported products to comply. Therefore, dismantling these regulations will lead to complex border checks and customs controls, which will, in turn, cause delays in the flow of goods between the UK and the EU. As S5, an expert in agricultural policy and trade, explains:

'…In terms of imports from the EU, that will be fine; where it becomes tricky is the export to the EU. The more the UK diverges from these stricter regulations, the more challenges it will face at the border. And separating the product to make sure the

[292] S3, Interview, 16 Feb. 2021.
[293] FSA (2022). The FSA strategy for 2022 to 2027

supply line is not contaminated will be extremely difficult, and eventually, it will bring about delays in product flows.'[294]

Also, given that Northern Ireland is guided by the EU's regulatory regime (under the NI Protocol), dismantling the PRT ban can disrupt the UK's internal market since certain GB products cannot be sold in the NI market. Moreover, a disturbance in the flow of products from the GB market to the NI market can bring about issues of food security and shortages since the supply chains of these blocs are highly integrated. As C2 argues:

'There will be a real problem for Northern Ireland, in terms of the movement of goods between GB and us [Northern Ireland]. We have already seen some producers saying, we are experiencing a shortage of certain food products, and that is set to get much worse if there is this divergence [dismantling]. And yet, it is difficult to see how to sort it out right now. I am very concerned because you cannot just suddenly reinvent a supply chain...I am not saying there are no alternatives to supply chains that currently rely on goods from Britain, but it is not a quick fix.'[295]

S12 further contends that:

'This could make sense economically because Northern Ireland is a tiny market compared to the rest of the UK. But politically, it is a huge mess. It will create complex constitutional problems and increase the agitation for a United Ireland - all these are real existential threats.'[296]

Aside from the challenges that the possible dismantling will bring to the UK, the larger market size of the EU will serve as an incentive to pull UK actors to align with the EU restrictions. The EU remains the single largest market for UK agriculture and food products, receiving over 60% of the UK's agri-food export in 2019.[297] Specifically for the poultry industry, NFU data show

[294] S5, Interview, 14 Mar. 2021
[295] C2, Interview, 17 Feb. 2021
[296] S12, Interview, 20 Aug. 2020
[297] ONS (2020). The total value of UK exports and imports of goods and services in current prices, chained volume measures and implied deflators.
https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/bulletins/uktrade/latest

that about 70% of British poultry meat exports in 2019 went to the EU.[298] Therefore, sacrificing the trading relationship with the EU to the US will not be economically beneficial to the UK. As S4, a trade policy expert, explains:

> *'The EU is still a vast market, it is the closest market to the UK, so there is a huge incentive to stay harmonised to the extent that we can maintain the free trade relationships. I do not see the volume of agri-food trade with the US, Canada or Australia benefiting the UK enough to make these changes.'*[299]

C2 also added:

> *'The evidence suggests that most of the markets for UK's agri-food is Europe [EU]. So, if we want to continue doing business with Europe, we must ensure that we remain aligned with the European policy….'*[300]

G2, from the Department of International Trade, emphasised that:

> *…the key challenge is how we maintain good levels of trade with the EU, which is our biggest market. How much we trade with the US matters, but it is far less… So, finding the balance to make sure our trade with the EU is not damaged will be the biggest thing.'*[301]

7.4.4 Global Opportunities, Drivers, and Constraints

Brexit and the EU-UK TCA allow the UK to have independent or 'unilateral' trade agreements with non-EU countries. Thus, the UK now has the scope to set its tariffs, decide on its sanitary and phytosanitary (SPS) measures, and the opportunity to dismantle (what critics refer to as) the 'EU protectionism in food'.[302] These arrangements could occur in two broad ways: having

[298] NFU (2019). What the EU trade deal means for British poultry. Blogpost.
[299] S4, Interview, 27 Apr. 2021
[300] C2, Interview, 17 Feb. 2021
[301] G2, Interview, 10 Oct. 2020
[302] *See* the Guardian (2 Mar. 2019). Cit. Loc. n. 272 above

a Free Trade Agreement (FTA) with third countries or trading with them under WTO terms (provided they are also a member).

FTAs come in different shapes and sizes. However, at the basic level, they seek to foreclose discriminatory protectionism and reduce non-tariff barriers to the optimum level possible. The current EU/UK restrictions have been at the centre of the ongoing UK-US trade negotiations because the US has long regarded the regulation as a protectionist act.[303] Moreover, a trade deal with the world's largest economy and the second-largest trading partner to the UK gives an economic incentive to dismantle the current regulations. As S4, an expert in agri-food trade, explains:

> *'In negotiating a free trade, each party attempts to maximise its interests…and trade-offs between sectors to secure the possible "the best deal" is inevitable. In most cases, agriculture is the last thing agreed upon…[therefore] the stakeholders are beginning to get the sense that the agricultural sector and some of these strict regulations will be "the sacrificial lamb" to get a trade agreement [with the US] through.'*[304]

Moreover, instead of FTA with third countries, the UK can trade with third countries under international trade laws or the WTO terms. The WTO rules contain agreements on SPS and Technical Barriers to Trade (measures to strike a balance between competing uses of regulatory standards in international trade). Justifying the ban on chemical PRTs at WTO will be problematic for the UK in trade disputes. As G1 contends:

> *'… the real issue with chlorinated chicken is that it is not a public health issue. It is around animal welfare and farming systems… And the problem is how do you defend farming systems and animal welfare issues at the WTO.'*[305]

[303] *See* the Guardian (2 Mar. 2019). Cit. Loc. 272
[304] S4, Interview, 27 Apr. 2021.
[305] G1, Interview, 14 Jun. 2020

7.5 Possible Outcome or Effects of de-Europeanisation

The UK's decision to either diverge or retain the existing PRT ban will depend substantially on the preferences of domestic stakeholders, domestic institutional drivers, pressure from the EU, and the external constraints arising from international trade and global bodies. The preceding analysis shows a near-consensus among the major stakeholder groups in the agri-food sector - from producers and distributors to consumers - to maintain the PRT ban. These preferences emanate mainly from the experience of past food safety crises, and thus, the stakeholders see the ban as a precautionary measure to protect public health. They also maintain that allowing the import of PRT-treated imports from third countries would put local producers at a competitive disadvantage and ultimately lead to a race to the bottom. The domestic stakeholders' preference for retaining the ban could be described as 'high' since almost all the major stakeholder groups are in favour of it.

Moreover, the legacies from the past crises and the associated reforms have created a particular institutional path that supports the ban in the UK. First, the FSA's core mission has been to protect the interests of consumers above all other interests. It has also maintained the EU's farm-to-fork approach to food safety governance, which, one way or the other, supports the current ban. Further, with the transfer of regulatory power back from EU agencies, UK agencies are under pressure to maintain or improve the public's trust (which declined during the BSE crises). Also, the strictness of the EU's regulatory regime for PRT will serve as a constraint for the UK to dismantle the regulations if it wishes to maintain the poultry trade with the EU. Moreover, the fact that almost all the major non-EU trading partners of the UK disagree with the ban serves as a critical driver to dismantling it.

The discussions show that it will be economically and politically beneficial for the UK government to retain the PRT ban. First, the government will need the support of numerous stakeholders for the effective implementation of regulatory policy decisions. Also, the electoral or political fortunes of the government are one way or the other connected to how the public perceives it to put them at the centre of policy decisions. Additionally, it will be economically

prudent to maintain the ban and get full access to the EU market, given that the EU remains the largest market for UK's agri-food products. The possible consequences of maintaining the ban may be that the UK will not get a comprehensive free trade deal with third countries such as the US. It may also receive retaliatory tariffs or restrictions on its products. However, the analysis demonstrates that the benefits of maintaining the ban will outweigh the cost and suggests that the UK government is likely to retain it post-Brexit. In summary, the analysis suggests that there will be a 'no dismantling' decision for the PRT ban post-Brexit.

Case Study II: The Restrictions on Farm Antibiotic Use

'There is a concern that such a restriction on the veterinary surgeon's ability to prescribe antibiotics prophylactically for administration to groups of animals…could have a detrimental effect on the health and welfare of such livestock and exacerbate potential spread of disease.' – Michael Gove (former Secretary of State for Environment, Food and Rural Affairs)[306]

'The EU, by its very infrastructure…and historic approaches to medicine use, has a complicated challenge when considering a response to AMR, and this will have influenced the approach it has taken in its legislation. Post-Brexit, we have the opportunity to frame future UK legislation which marries our successful voluntary approach with an appropriate legislative framework that is the best fit for UK agriculture.' – Responsible Use of Medicines in Agriculture (RUMA)[307]

[306] *See* The Guardian (25 Oct. 2018). 'European parliament approves curbs on use of antibiotics on farm animals' https://www.theguardian.com/society/2018/oct/25/european-parliament-approves-curbs-on-use-of-antibiotics-on-farm-animals

[307] *See* RUMA (2022). 'RUMA response to new EU antibiotics policy'. https://www.ruma.org.uk/ruma-response-to-new-eu-antibiotics-policy/

7.6 A Brief Overview

Numerous reports have cited the overuse of antibiotics in farming as a significant contributor to the global surge in AMR.[308] To address this challenge, in 2006, the EU prohibited the use of antibiotics as growth promoters (AGPs).[309] This ban was directly applicable and transposed into the UK's domestic law. In 2018, the EU passed new legislation[310] to prohibit further the prophylactic (preventive) use of farm antibiotics. However, this new legislation came into effect in February 2022 – after the UK had left the Union – and thus, it did not apply to the UK. Moreover, prophylaxis in farm animals is still legal and common in some of the major trading partners of the UK, including the US, Canada, Australia and New Zealand.

The following subsections analyse the post-Brexit antibiotic regulatory politics and trade relationships between the UK, the EU, and third countries. First, it analyses stakeholders' perspectives, from producers, distributors, civil society, and environmental groups, about the possible alignment or divergence from the EU's regulatory regime. The subsections also discuss the internal and external drivers, opportunities and constraints to the probable alignment or deviation from the EU's antibiotic restrictions. Finally, the section predicts the possible outcome and effects of dismantling the EU's AMR regulatory strategies in the post-Brexit agri-food sector.

7.6.1 Stakeholders' Perspectives

The analysis of the interviews, statements and responses shows no considerable pressure from the key domestic stakeholder groups to dismantle the ban on AGPs. Despite the initial objections from producers and farmers' groups, including the NFU and RUMA, the analysis

[308] *See* O'Neill Report (2016). Tackling drug-resistant infections globally: final report and recommendations; and Lancet Report (2019). Public health burden of antimicrobial resistance in Europe.
[309] See Regulation 1831/2003/EC
[310] See Regulation (EU) 2019/6 on Veterinary Medicines and Regulation (EU) 2019/4 on Medicated Feed.

shows that they no longer maintain opposition to the prohibition of AGPs. [311] However, these actors demand a level playing field in post-Brexit trade arrangements with non-EU countries. According to them, importing animal foods produced with AGPs will put British farmers at a competitive disadvantage and jeopardise the years of progress in maintaining high animal welfare standards and the fight against AMR. As explained by the President of the British Veterinary Association (BVA), Gudrun Ravetz:

> *'The maintenance of animal welfare standards should be absolutely integral to the negotiation of any new trade agreements. If we are going to have an expectation that UK farmers are working to a higher welfare standard, which is welfare outcome-based, it needs to be recognised, rewarded and protected so that it is not anti-competitive for our UK farmers. That would necessitate a level-playing field on imports.'*[312]

The Chief Executive of the National Beef Association, Chris Mallon, also argues that British farmers do not have an intention to reduce animal welfare standards after Brexit. However, they are worried about other products that will be allowed to come in through trade deals. As he explains:

> *'A growth promoter [AGP] would make us more efficient. It is not necessarily going to be what a consumer wants, but it would give us efficiency so we can compete…We are told to control our use of antibiotics…We are doing things that other people are not doing, and we are already at that standard. This is about maintaining standards. If you want us to compete economically with those countries, you are going to have to say that you will reduce those standards. No farmer in my association wants to reduce our standards just to compete with world trade.'*[313]

[311] RUMA (13 Oct. 2017). RUMA welcomes call to action on antibiotics – but underlines UK position on farm animal use. https://www.ruma.org.uk/ruma-welcomes-call-action-antibiotics-underlines-uk-position-farm-animal-use/

[312] See The European Union Committee of the House of Lords 5th Report of Session 2017–19. 'Brexit: farm animal welfare'. Pg 30

[313] See The European Union Committee of the House of Lords 5th Report of Session 2017–19. Cit. Loc. No. 312 above.

The President of NFU, Minette Batters, also added that:

> *'US farmers can out-compete UK farmers on price by using products and methods banned in the UK... That's not a criticism of US farmers but a statement of fact about the different legal requirements facing farmers in the UK… Allowing free access for cheaper US produce would completely take the legs out of our farming sector, with higher production costs leaving farmers completely uncompetitive…If the government chooses to pursue a trade deal that facilitates products entering the country produced to these banned methods, I would consider that a betrayal of British farmers and the values we all stand for.'*[314]

Moreover, there have been varied views concerning the EU ban on prophylaxis in farm animals. The analysis identified two main actor coalition groups advocating whether the UK should ban the preventative use of antimicrobials on farm animals or not. The first group, led by the Alliance to Save Our Antibiotics (ASOA),[315] advocates for the adoption of the ban in the UK. They argue that the UK will lose its status as one of the world leaders in the fight against AMR and 'end up with some of the weakest regulatory standards in Europe' if it fails to adopt the ban. Additionally, the coalition calls for restrictions on imports from countries with less rigorous antibiotic requirements to ensure a level playing field for UK farmers and help halt the spread of AMR genes. According to Cóilín Nunan, the scientific advisor of ASOA:

> *'The government cannot claim to be a world leader when the UK is one of the only countries in western Europe where it will be legal to use antibiotics routinely for preventive mass medication of farm animals...The UK will then probably end up with some of the weakest regulatory standards in Europe, which raises questions about the*

[314] See NFU (2018). 'Do not betray British farming in future trade deals.' **https://www.nfu-cymru.org.uk/archive?treeid=118963**

[315] Alliance to Save Our Antibiotics comprises health, medical, environmental, and animal welfare organisations.

kinds of trade deals we will be seeking with non-EU countries like the US, China and Australia, which have much higher levels of antibiotics in farming.'[316]

ASOA admits that UK farmers have made significant progress by voluntarily reducing their antibiotic use by around 50%.[317] However, it maintained that most of these voluntary cuts were made when farmers' groups learnt that the EU was about to pass stricter regulations. It also contends that antibiotic usage in animals such as pigs remains comparatively higher than in other countries, such as Denmark and Netherlands. ASOA suggests that new laws ending preventive antibiotic group treatments will lead to a more significant cut.[318] As C1 puts it:

'…in fairness, there has been a significant cut in farm antibiotic use over the last 4-5 years. It is the first time that this has happened, and many of them came through voluntary action. But it began when the EU was agreeing on this new rule to ban preventive mass medication, so these kinds of ideas were being discussed, and everybody in the industry knew that much greater restrictions were coming. They wanted to avoid any bans, so they started to voluntarily take action to avoid regulation. And also, there was the 2015 government commission, O'Neill review, which called for reductions in farm antibiotic use globally. And so, they saw that they could not continue with business as usual, so they have cut the use of it. The bottom line is that those reductions are at the moment voluntary and could be reversed. And also, the reduction in the pig industry although they have made large cuts, they could still make much larger cuts going forward, and that is less likely if these regulations are not implemented.'[319]

[316] See The Guardian (28 Jan. 2022). 'UK risks falling behind on reducing farm antibiotics after EU ban.'
[317] See DEFRA (2021). 'UK veterinary antibiotics sales more than halved over the past six years'. Press Release. https://www.gov.uk/government/news/uk-veterinary-antibiotics-sales-more-than-halved-over-the-past-six-years
[318] See Alliance to Save Our Antibiotics (2020). Supermarket antibiotics policies assessment 2019. Report. https://www.saveourantibiotics.org/media/1826/supermarket-antibiotics-policies-assessment-2020-report.pdf
[319] C1, Interview, 10 Jun. 2020.

There is also an opposing advocacy coalition, comprising the industry and farmers' groups, led by the RUMA alliance. This Alliance advocates maintaining voluntary measures rather than legal controls. According to them, group preventive antibiotics are inevitable in intensive farming systems. Therefore, regulatory policies should focus on 'responsible use' rather than an outright ban. As Catherine McLaughlin, the Chair of RUMA and NFU chief scientific adviser for animal health and welfare, explains:

> *'[there would] always be some instances and conditions that unavoidably require the treatment of groups of animals to help protect their health and welfare…RUMA believes it is important for vets to have medicines available to tackle disease and ensure animal health and welfare, following the principles of responsible use: as little as possible, but as much as is necessary, at the right time and in the right situations.'*[320]

She added that:

> *'….arbitrary restrictions on the use of antibiotics and various other pharmaceutical products such as fungicides could have a detrimental impact on animal and plant health. Antibiotics should be used in a responsible manner – as little as possible but as much as needed.'*[321]

Some members of the Alliance also contend further that arbitrary control of antibiotics can be detrimental to animal health and welfare. For example, as explained by the former President of BVA, Sean Wensley:

> *'The use of antibiotics in agriculture is just one piece of the jigsaw when tackling AMR and we need to see increased collaboration… BVA is opposed to the introduction of arbitrary, non-evidence-based target setting; such targets, to reduce antibiotic use, risk*

[320] See The Guardian (28 Jan, 2022). 'UK risks falling behind on reducing farm antibiotics after EU ban.'
[321] NFU (2016). 'NFU responds to independent review on AMR.'
https://www.nfuonline.com/archive?treeid=56437

restricting vets' ability to treat disease outbreaks in livestock, which could have serious public health and animal welfare implications.'[322]

Additionally, some members of the coalition argue that the existing voluntary approach has already put the UK ahead of most EU countries, and therefore, there is no need for compulsory controls and prohibitions. As the Chief Executive of the British Poultry Council (BPC), Richard Griffiths, posits:

'We [the UK] are recognised as a leading proponent of responsible use of antibiotics, so no I do not think there is a danger of us falling behind anyone…A large part of our success is based on trusting veterinary colleagues to make expert judgments on a case-by-case basis and then pooling what has been learned. Compulsory controls are unnecessary at this point and would be too blunt an instrument for what is an incredibly complex subject.'[323]

Phil Stocker, the Chief Executive of the National Sheep Association, also added:

'Moving on to antibiotics, I feel that what is going on through RUMA has been really effective. As long as government keeps a watching eye over this and as long as we keep making progress, I think it will be enough. I do not personally feel that we need more government intervention when it is quite clear that the industry is really trying to get its head around this and to do something about it.'[324]

7.6.2 Internal Institutional Drivers and Constraints

As discussed earlier in Chapter Five, the UK government has long preferred voluntary and industry-led measures to the legal control of farm antibiotics. This preference has been embedded in the UK's organisational structures and culture for antibiotic governance. For

[322] NFU (2016). Cit. Loc. n. 321 above.
[323] *See* The Guardian (Jan 28, 2022). 'UK risks falling behind on reducing farm antibiotics after EU ban.'
[324] See The European Union Committee of the House of Lords 5th Report of Session 2017–19. 'Brexit: farm animal welfare'. Pg 50

instance, the more significant part of the government's response to O'Neill's recommendation on agricultural antibiotic use was collaborating with farmers and the agricultural industry to develop effective stewardship and optimisation plans. The poultry, sheep and beef sectors all have stewardship programmes to share best practice and promote responsible antibiotic use. RUMA also has a 'Targets Task Force' that delivers on the government's objective of identifying sector-specific targets for reducing or replacing farm antibiotics. The success story of these industry-led initiatives serves as a spur for the government to maintain the existing voluntary regimes. As S6, a veterinary surgeon and expert in AMR policy, posits:

> *'…The UK-VARSS [The UK-Veterinary Antibiotic Resistance and Sales Surveillance] report shows substantial reductions in the use of antibiotics in the past six years and we are seeing reductions in resistance as well. These successes have largely been attributed to the voluntary stewardship and monitoring practices led by farmers and the industry…[therefore] I do not see the UK going the hard way [of banning preventive antibiotic use]. But rather, the government is likely to increase its supervisory role on these industry-led initiatives to strengthen the existing regime.'*[325]

Moreover, as discussed in chapter five, the Europeanisation of AMR and antibiotic regulatory politics led to an alliance between the UK and EU organisations. For instance, the Alliance to Save Our Antibiotics (ASOA), the lead campaign group for antibiotic use in the UK, still has active members from the EU. The interaction of these members and exposure to different policy options enable domestic stakeholders to compare the impacts of the UK's regulatory approach to other EU countries. Thus, the EU ban will be used by domestic campaigners as a yardstick to pressure the government to adopt stricter measures. As S2, an expert in AMR surveillance and policy, predicts:

> *'I suspect that politically we [the UK] will do something that appears to follow the EU to some extent. Because, definitely, the complete ban imposed by the EU will lead to*

[325] S6, Interview, 27 Nov. 2021

significant cut [in antibiotic use] in European Countries…To protect our reputation as a global leader in the fight against AMR, we cannot afford to be among the top users [of antibiotics] here in Western Europe. So, we are likely to follow the EU in this regard.'[326]

7.6.3 The Brussels Effect

The new EU veterinary medicine regulation restricts the importation of all meat and dairy treated with AGPs. Additionally, the non-regression clause of the EU-UK TCA entreats both Parties not to lower their standards below the point when the UK left the Union. This clause applies to AGP because the EU ban was enacted before Brexit and has been transposed into domestic law. Thus, an attempt to dismantle the ban will limit the UK's meat and dairy export to the EU market, increase bureaucracy at the borders, and attract further trade sanctions from the EU. To summarise, the stringency of the EU regulation on AGPs and the non-regression clause is a constraining factor for the UK to diverge or dismantle the ban.

Conversely, the EU ban on mass preventative antibiotics in farm animals is not stringent in non-member countries. The restrictions apply only to local producers (and do not necessarily require exporters to comply). This implies that the UK can diverge and still be able to export to the EU without any additional restrictions. Additionally, the non-regression clause is not applicable in this case since the UK left the Union before the ban came into effect. As G2 from the Department of International Trade argues:

'…Unlike the ban on AGPs, the UK is not compelled in any way to follow the restrictions on prophylactic mass medication…Essentially, the new [veterinary medicine] regulation does not demand third countries to follow the same restrictions before they can export to the EU market…The UK only needs to make sure that it maintains low

[326] S2, Interview, 25 Nov. 2020.

levels of antibiotic use in order not to breach the non-regression and the LPF [level playing field] commitments in the Agreement.'[327]

Moreover, because Northern Ireland remains under the EU's regulatory regime, the ban on prophylaxis applies to NI farmers. Therefore, any substantial divergence will place an unequal regulatory burden on them. The possible remedy may be to provide some form of subsidy to livestock farmers in NI. However, such subsidies will also give them an unfair advantage over EU farmers and lead to a potential breach of the LPF clause of the TCA. Thus, the NI protocol is a constraining factor for the UK to diverge from the EU antibiotic regulatory regime. As S9, an agri-food policy expert, explains:

'…the protocol for Northern Ireland shows strong indications that there will be issues of consistency for the UK's internal market. Right now, Northern Ireland is still in the EU regulatory regime…they are bound by the new regulation [prophylactic antibiotic ban]. Failure to implement this ban in the UK will mean farmers in Great Britain will enjoy lighter regulations and lower regulatory cost than their counterparts across the channel [NI]... The government may choose to use subsidies to address this imbalance. But the TCA also forbids the use of incentives that may give either party an unfair advantage… divergence will definitely create complications for the UK-EU trade relations.'[328]

7.6.4 Global Opportunities, Drivers, and Constraints

The current EU/UK AMR regulations prohibit all AGPs from livestock farming. However, most of the major trading partners of the UK, including the US, Canada, Australia and New Zealand, permit the use of certain antibiotics such as Bacitracin, Carbadox, Bambermycin as growth promoters. The new EU veterinary medicines regulation prohibits the importation of AGP-treated products from third countries, but such restrictions have not been implemented in the

[327] G2, Interview, 10 Apr. 2021
[328] S9, Interview, 25 Jan. 2021

UK. Thus, a free trade agreement (FTA) with these countries may be a potential incentive to loosen the AGP restrictions. However, most of the experts interviewed believe that there will not be any substantial pressure from those third countries for the UK to dismantle the AGP ban. As S5, an expert in agricultural policy and trade, explains:

> *'At the moment, most of the major trading partners of the UK have put in place some form of restrictions on the use of AGPs…The US, Canada, Australia and New Zealand have all banned antibiotics considered as medically important. Even though, they are still lagging behind the UK and the EU in terms of rigidity; but, if anything at all, we can see the pendulum swinging towards a complete ban of all AGPs globally. So, I think the [UK] ban on AGPs is non-negotiable in any trade deal.'*[329]

Moreover, the ban on prophylactic antibiotics has been opposed by some of the major trading partners of the UK. For instance, the former chief agricultural negotiator of the US, Gregg Doud, described the ban as a 'thinly veiled reason to create a trade barrier'.[330] In the post-Brexit trade negotiations, the US has urged the UK to loosen up all barriers, such as this ban, to facilitate a free trade deal.[331] Additionally, the complete ban on preventative antibiotic use is stricter than the international (OIE) AMR standards[332] which permit the use of certain antibiotics. The SPS Agreement also discourages arbitrary restrictions without proper scientific justification for why the OIE standard would not work to protect public, animal or environmental health. Thus, the UK will face the challenge of defending a ban at the WTO and risk attracting retaliatory tariffs or restrictions from other trading partners if it decides to

[329] S5, Interview, 14 Mar. 2021.

[330] *See* ASOA (2020). 'Farm antibiotic use in the United States A threat to UK standards?' https://www.saveourantibiotics.org/media/1830/farm-antibiotic-use-in-the-united-states-2020-a-threat-to-uk-standards.pdf

[331] *See* USTR (2019). 'United States-United Kingdom Negotiations'. Summary of Specific Negotiating Objectives. https://ustr.gov/sites/default/files/Summary_of_U.S.-UK_Negotiating_Objectives.pdf

[332] The WTO has adopted the OIE standards as the global benchmark to harmonise AMR regulations. *See* OIE List of Antimicrobial Agents of Veterinary Importance. https://www.woah.org/fileadmin/Home/eng/Our_scientific_expertise/docs/pdf/Eng_OIE_List_antimicrobials_May2015.pdf

implement it. Therefore, the FTA negotiations and international standards and guidelines for AMR serve as a constraining factor in adopting the ban on prophylactic antibiotic use.

7.7 Possible Outcome or Effects of Dismantling

The UK's decision to maintain or dismantle the restrictions on antibiotics will depend substantially on the preferences of its domestic stakeholders, domestic institutional drivers and constraints, pressure from the EU, and global opportunities and constraints. Concerning the ban on AGPs, the analysis shows that most domestic stakeholder groups, including farmers, the agricultural industry and CSOs, are in favour of its preservation. However, they have demanded that the ban be extended from local goods to include imports to create a level playing field for UK farmers. Also, because the EU regulations on AGPs are stringent – requiring both local products and imports to comply – the UK will be attracted to remain aligned with the ban to export into the EU market. Moreover, because most of the major trading partners of the UK are progressively adopting bans on AGPs, there will not be significant dismantling pressure from those countries. Therefore, the analysis suggests there will be no dismantling of the AGP ban in the UK post-Brexit. Instead, the UK government will likely follow the EU and expand the ban to cover imported goods to protect local producers from cheaper AGP-treated products.

The analysis identified two main opposing coalitions concerning the EU ban on the prophylactic use of antibiotics. The first coalition advocates alignment with the EU for a complete ban on preventative mass medication. They argue that, despite the significant cut in antibiotic usage in the UK through voluntary measures, legal controls will be the best option to bring down 'misuse' to the minimum level possible. The other group, comprising farmers and the agricultural industry, advocates for the *status quo* – to promote 'responsible use' rather than a complete ban of preventative mass medication. The pressure from domestic actors can therefore be inferred as 'balanced'.

Moreover, the past preferences of the UK government have created institutional patterns embedded in the governance arrangements for AMR. For instance, the UK has one of the most effective industry-led voluntary schemes, contributing to a significant cut in antibiotic use in the past decade. In one way or the other, the UK has been locked in a path that supports voluntary schemes, and thus reverting to legal controls will be economically burdensome. Therefore, the domestic institutional driver for regulatory divergence from the EU can be described as 'strong'.

Further, the ban on prophylaxis is not stringent on non-member countries from the EU's side. This means the UK can still export to the EU market without additional restrictions. However, the past Europeanisation of AMR regulatory regimes will enable domestic actors to download EU policies into domestic discourse. The pressure from the EU for the UK to adopt the ban will therefore be moderate. As almost all the major trading partners of the UK permit preventative mass medication, there will not be any pressure for the UK to adopt the ban. Furthermore, the complete ban on preventative antibiotics is above the international (OIE) standards; hence, there will be substantial pressure from global bodies and third countries for the UK to dismantle or not to adopt the ban.

Given the 'balanced' perspective of the stakeholders, the enhanced institutional capacity for voluntary measures, and the low pressure from the EU, the analysis suggests that the UK will dismantle or diverge from the EU ban on preventative antibiotics 'by default'. The UK will likely use consensual regulatory measures compared to the EU's command and control approach. The possible effect of this divergence is the disruption of the UK's internal market since NI is still within the EU's regulatory regime. NI farmers are likely to have a higher regulatory burden and be more economically disadvantaged than GB farmers. As a consequence, the government may need to use economic incentives to rebalance the regulatory burden although this carries competitive risks.

Case Study III: The Ban on Neonicotinoids

"I have always been clear, I will be led by the science on this matter. The weight of evidence now shows the risks neonicotinoids pose to our environment, particularly to the bees and other pollinators…is greater than previously understood. I believe this justifies further restrictions on their use. We cannot afford to put our pollinator populations at risk…I recognise the impact further restrictions will have on farmers and I am keen to work with them to explore alternative approaches both now and as we design a new agricultural policy outside the European Union.' – Michael Gove (Former Secretary of State for Environment, Food and Rural Affairs)[333]

'It remains possible that neonicotinoids are relatively benign and that the risks from their use are proportionate to the benefits they provide. Uncertainty will always be a problem when making judgements about diffuse environmental impacts, but we can be much more certain about the fact that these diffuse effects are part of a farming system that needs overhauling and a thorough reform. If further restricting, but not banning, neonicotinoids encourages genuine innovation and stops the next cycle of chemical abuse of the environment, then progress will have been made.' – Ian Boyd, Former Chief Science Adviser, DEFRA (Boyd, 2018)

7.8 A Brief Overview

Neonicotinoids are among the world's most widely used group of insecticides, used to protect crops such as oil seed rape and cereals from pests (Jeschke et al., 2011). In 2012, some new studies found a connection between neonicotinoids and colony collapse disorder. Following the EFSA's report affirming that 'bees are exposed through multiple vectors previously unknown',[334] the EC restricted the use of three neonicotinoids - imidacloprid, clothianidin, and thiamethoxam in 2013. In 2018, the Commission extended the restrictions to ban the outdoor

[333] DEFRA (2007). Environment Secretary backs further restrictions on neonicotinoid pesticides. Press release. https://www.gov.uk/government/news/environment-secretary-backs-further-restrictions-on-neonicotinoid-pesticides

[334] EFSA (2008). Neonicotinoids: risks to bees confirmed. https://www.efsa.europa.eu/en/press/news/180228

use of those active substances completely. Following the EUWA, this ban is applicable and has been transposed into the UK's domestic law.

However, neonicotinoids are still legal and popular in most countries, including the UK's major trading partners such as the US, Canada, Australia and New Zealand. Consequently, trade negotiations with these countries raise concerns about whether the UK will maintain or dismantle the ban to secure FTAs. The following subsections analyse the drivers, constraints, and effects of the possible dismantling of the neonicotinoids' ban post-Brexit. The first subsection (6.8.1) analyses the views and preferences of different stakeholders, including farmers, the agrochemical industry, and environmental and consumer groups. The subsequent subsections (6.8.2 – 6.8.4) discuss the internal and external drivers and constraints to the probable alignment or divergence from the EU's regime.

7.8.1 Stakeholders' Perspectives

The analysis identified two opposing perspectives among domestic stakeholder groups concerning the ban. The first group, mainly consisting of environmental NGOs and consumer groups, advocates for the retention of the ban and implementation of further restrictions on all other PPPs perceived to be harmful to the environment. In addition, they stress the need to move towards a more sustainable and nature-friendly food system less dependent on pesticides. As expressed in a joint letter signed by Pesticide Action Network (PAN UK), Royal Society for the Protection of Birds (RSPB), and Wildlife and Countryside Link to the then-Secretary of State for the Environment, Food and Rural Affairs, Michael Gove:

> *'…the UK's exit from the EU should not lead to any weakening of pesticide standards. It is imperative that we [the UK] use this unique opportunity to embed a more sustainable form of farming which is less reliant on pesticides.'*[335]

[335] PAN UK (2019). Pesticides Forum and Voluntary Initiative – Resignation Letter. https://www.pan-uk.org/site/wp-content/uploads/Pesticides-Forum-and-Voluntary-Initiative-Resignation-Letter.pdf

The environmental groups argue that given the growing evidence of the impacts of pesticides on the natural environment, an attempt to dismantle the ban will breach public trust. Furthermore, they contend that the public has explicitly expressed its desire for higher environmental standards, so it is up to the government to safeguard the public interest by retaining the ban on neonicotinoids. As explained by Craig Bennet, the Chief Executive of the Wildlife Trust:

> *'The evidence of the devastating impact this group of pesticides is having on our wildlife just keeps growing…If the government were to even flirt with the idea of ending the ban on neonicotinoids, it would be a clear and catastrophic breach of public trust…Hundreds of thousands of people came together across Britain over the last decade to call for better protection of our bee populations, and for these highly toxic pesticides to be banned. What we need right now is urgent action to restore the abundance of our insect populations, not broken promises that make the ecological crisis even worse.'*[336]

Following the UK government's decision to grant emergency authorisation to the banned neonicotinoids in 2021,[337] a coalition of environmental groups, including PAN UK, Friends of the Earth, RSBP and the Soil Association, wrote to the government to rescind the decision. They contend that:

> *'Allowing farmers to use these harmful pesticides [neonicotinoids]…undermines the UK Government's own objective to leave the environment in a better state than it found it…The government has an opportunity here to take a different course, to help farmers tackle the ecological emergency and adapt to climate change. As a group…representing a broad range of environmental and health concerns we urge the*

[336] The Telegraph (08 Jan. 2021). Bee killing pesticide banned by the EU approved by the government. https://www.telegraph.co.uk/news/2021/01/08/bee-killing-pesticide-banned-eu-approved-government/

[337] DEFRA (2021). Statement on the decision to issue – with strict conditions – emergency authorisation to use a product containing a neonicotinoid to treat sugar beet seed in 2021. https://www.gov.uk/government/publications/neonicotinoid-product-as-seed-treatment-for-sugar-beet-emergency-authorisation-application/statement-on-the-decision-to-issue-with-strict-conditions-emergency-authorisation-to-use-a-product-containing-a-neonicotinoid-to-treat-sugar-beet

UK government to reverse this decision and instead invest in supporting farmers to research and adopt non-chemical alternatives to farm with nature instead of against it.'[338]

The other coalition, comprising mainly of farmers and the agrochemical industry, opposes the ban and the continuous restrictions on PPPs. They argue that the current EU/UK pesticide regulatory regime does not factor socio-economic issues such as food security and a healthy diet into the regulatory decision-making process. Notably, they raise concerns about the unavailability of economically feasible alternatives to PPPs in the short term, which can lead to other sustainability challenges such as food and feed shortages. As I2 of Agricultural Industries Confederation (AIC) posits:

'Since the 1960s, PPPs have contributed immensely to high yields and affordable food prices in such a way that in the UK, only 10% of average household income is spent on food. With the continuous restrictions on these products [PPPs], food prices are expected to rise again…And no matter how marginal this price change may be, it will affect the buying habits of some section of the population, especially those in the lower income bracket. So, you will see people buying less fruits and vegetables to cheaper high fat and sugar food products…which indirectly lead to more health problems such as obesity, diabetes and other neuro-generative diseases. However, all these are not factored in the pesticide discourse. Particularly problematic is the unavailability of economically feasible and accessible alternatives in the short term….'[339]

I1 from Crop Protection Association (CPA) contends further that:

'…to make a decision, when you are employing new guidance or bringing in new regulations, you need to know the whole impacts…And there are socio-economic impacts, which were not factored in... So, it has a lot of unintended consequences

[338] *See* PAN UK (2021). 'Organisations unite against neonicotinoids decision'. Civil Society Letter to SoS for Environment, Food and Rural Affairs https://www.pan-uk.org/site/wp-content/uploads/Civil_Society_Letter_SoSEustice_on_neonicotinoid_derogation_Jan2021.pdf

[339] I2, Interview, 10 Jun. 2020.

which need to be looked at into the future and I hope the UK does that. The EU is going the tunnel of anti-pesticides; you can see that in the farm-to-fork strategy and their green deal, but to feed the amount of people we have, we need to consider all the available technologies.'[340]

The farmers' groups and some food and trade policy experts have also expressed concerns about the possible imports from countries that still use neonicotinoids. According to them, importing from these countries will put UK farmers at a competitive disadvantage. As S10, an expert in regulatory policy and trade, posits:

'...*We [the UK] used to grow one million tonnes of oilseed rape a year; but now, because of the legislation [the ban on neonicotinoids], we can grow only one million tonnes. What is happening is that we are importing these same products from countries that are still using neonicotinoids. And you see, it is a global market, so we have to be very careful that we don't disadvantage our farmers…We have to reward them enough that they can take things forward and grow the food we want to eat in this country under sustainable schemes.'*[341]

F1 from NFU Scotland also added that:

'…we obviously import products from other countries which have been using it [neonicotinoids], and that is, to be honest, where the frustration comes. It is a disadvantage, it increases the cost of production, and we are undercut by cheaper imports from countries who are allowed to use that technology [neonicotinoids].'[342]

7.8.2 Internal Institutional Drivers and Constraints

As discussed in Chapter Fiver, the UK government, especially the Conservative Party, has historically preferred market-based and voluntary measures to statutory controls of pesticides.

[340] I1, Interview, 03 Jun. 2020
[341] S10, Interview, 17 Feb. 2021
[342] F1, Interview, 27 Oct. 2020

This preference was evident in the rejection of the 'Pesticides Bill' in 1972. Since the 1990s, the government has created joint voluntary initiatives with farmers and the industry to reduce pesticide-related environmental harm. The 'Pesticides Forum'[343] and 'Voluntary Initiative'[344] are examples of these voluntary structures that still exist to ensure the sustainable use of pesticides in the UK. However, unlike the antibiotic and AMR regimes, voluntary pesticide initiatives have not been successful in cutting down pesticide use. This development has intensified the call for strict regulatory measures post-Brexit. As expressed by PAN UK, RSPB, and Wildlife and Countryside Link – in their joint letter of resignation from the voluntary groups:

> *'Our organisations have long participated in these voluntary groups in the hope that they would lead to better protection for the environment…However, in that time they have failed to take meaningful or significant action to reduce pesticide-related harms… the area of UK land being treated with pesticides has risen by more than half, and many of our crops are being treated more times with a wider variety of chemicals… The evidence of the ongoing deterioration of our environment clearly shows that voluntary measures have failed. As the UK exits the EU…, it is more important than ever that we introduce mandatory measures which both reward those farmers working hard to use minimal or no pesticides, and discourage the overuse of pesticides that we know causes such harm to our environment.'*[345]

The UK also has a strong preference for pragmatic and risk-based regulatory measures for PPP governance as compared to the precautionary and hazard-based regulatory approach of the EU. For instance, in the case of the neonicotinoids ban, the UK government consistently opposed it for lack of sufficient evidence. However, it later admitted that the weight of evidence was significant enough to justify further restrictions. As the then-Secretary of State for Environment, Food and Rural Affairs, Michael Gove posits:

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[343] The UK government set up the Pesticides Forum in 1996 to bring together a range of organisations with interests in pesticides and the impacts of their use.

[344] The Voluntary Initiative is an industry-led programme to promote best practice in PPP use in the UK. *See* https://voluntaryinitiative.org.uk/about/about-us/

[345] PAN UK (2019). Cit. Loc. No. 338 above.

'…The weight of evidence now shows the risks neonicotinoids pose to our environment, particularly to the bees and other pollinators …, is greater than previously understood. I believe this justifies further restrictions on their use…I recognise the impact further restrictions will have on farmers and I am keen to work with them to explore alternative approaches both now and as we design a new agricultural policy outside the European Union.'[346]

Following the UK's risk-based and pragmatic orientation, the recognition of evidence between neonicotinoids and the environment may serve as an incentive to retain the ban post-Brexit. Moreover, as discussed in chapter five, the EU adopted the hazard-based regulatory approach and other strict environmental regulations used by some member states such as Sweden, France, and Germany to restrict neonicotinoid products and other environmental regulatory decisions. Through cross-loading and downloading of EU policies and programmes, these norms have progressively been embedded into the UK's regulatory discourse. As a result, domestic actors will use EU environmental standards, including the restrictions on neonicotinoids, as a yardstick to pressure the government to adopt stricter measures. As C2 of the Chartered Institute of Environmental Health (CIEH) argues:

'The [UK] public is increasingly becoming environmentally conscious… In recent YouGov polls, most people consider the environment the third most pressing issue facing the country [UK]… Now, the government has the responsibility to make sure that environmental standards do not "slip lower" than the EU…Anything below the EU standards means we [the UK] are lagging behind; this includes the neonics ban…Given the weight of evidence that we now have, we cannot play around and lift the ban.'[347]

[346] DEFRA (2007). Cit. Loc. no. 333 above.
[347] C2, Interview, 17 Feb. 2021.

7.8.3 The Brussels Effect

The EU does not restrict the importation of goods from countries that use the prohibited PPPs; however, it does have a strict 'import tolerance' rate for such products. This implies that the UK can still export neonicotinoid-treated products to the EU market, but it must adhere to strict maximum residue limits. These restrictions can potentially cause delays at the UK-EU border and affect the free flow of goods to the EU market. As F1 of NFU Scotland recounts:

> *'The EU sets its MRLs and import tolerance rate at a very low level to the point that it is almost like a ban… And sometimes you may have cross-contamination; so it might be that you do not use the product, but you might store it in a store where products which have been treated with these active substances…and they might pick some tiny residues. So this could hinder our ability to export to the EU market….'*[348]

Furthermore, the non-regression clause of the EU-UK TCA applies to the neonicotinoids ban since it came to effect before the UK left the Union. This implies that dismantling the ban may attract trade restrictions, sanctions, or tariffs from the EU. Moreover, because the NI Protocol requires NI farmers to remain under the EU's regulatory regime, any substantial divergence from the ban will place an unequal regulatory burden on them. In summary, the non-regression clause and the NI protocol constrain the UK from diverging or dismantling the neonicotinoid ban.

7.8.4 Global Drivers and Constraints

The EU ban on neonicotinoids and its strict import tolerance rate has been opposed by several countries, including the US, Brazil, Canada and Australia, at the WTO.[349] In a communication to the WTO's Council for Trade, seventeen countries expressed concern about the restrictions on neonicotinoids and other active substances and their accompanying import tolerance rate.

[348] F1, Interview, 27 Oct. 2020.
[349] WTO (2019). 'European Union – Implementation of Non-Tariff Barriers on Agricultural Products'.

They contend that the ban is inconsistent with the technical barriers to trade (TBT) and the SPS Agreement of the WTO. According to them:

> *'…To ensure a balanced approach, the international community has determined standards that follow the principle of evidence and science-based risk assessments…However, the EU is diverging from those standards by incorporating a hazard-based approach to the approval and renewal of plant protection product authorizations for certain substances. This is creating a high degree of uncertainty with respect to how import tolerances will be considered and set for authorization decisions in the EU…[It] has not clarified…how it intends to consider applications for import tolerances for those substances.'*[350]

Maintaining the neonicotinoids ban and its import tolerance means the UK will face similar opposition from the WTO and third countries in free trade negotiations. Moreover, easing the import restrictions will give other countries a competitive advantage over UK farmers. A probable solution to this competition problem will be to provide local farmers with subsidies to counterbalance the additional regulatory cost and put them on the same pedestal as their international competitors. As G2 of the Department of International Trade explains:

> *'…If we put such a high demand for quality on them [the UK farmers] …it means it cost more to produce food here than elsewhere…And when you raise tariffs or bring any restrictions, they will say it is protectionism…that is the challenge we face anytime we go into FTA negotiations…But, in the broader sense of things, that is why we have things like the CAP and other subsidies for the farming community, so that we can keep them afloat. So, we protect them in different ways to maintain this kind of legacy of agriculture in the UK, even while being competitive. So, I think we must see a move towards where, basically, British farmers continue to be out-competed, but we find other ways of protecting them.'*[351]

[350] WTO (2019). Cit. Loc. No. 349 above.
[351] G2, Interview, 10 Oct. 2020.

7.9 Possible Outcome or Effects of Dismantling

The preceding analysis shows two opposing groups of stakeholders as regards the ban on neonicotinoids. The first group advocates for the retention of the neonicotinoid ban and the implementation of further restrictions on PPPs. They argue that failure to maintain the ban will betray public trust and may eventually lead to an environmental catastrophe. The other group, comprising the farmers' group and the agrochemical industry, advocates for the dismantling of the neonicotinoid ban. They contend that the EU has taken the path of anti-pesticides, which will not be suitable for the sustainability of the post-Brexit agri-food sector in the UK. Thus, domestic stakeholder preferences for the neonicotinoid ban can be inferred to be evenly 'balanced'.

Moreover, the decades of harmonisation and the transposition of EU pesticide regulations into domestic laws have caused EU norms and standards to be embedded into the UK's regulatory structures. Also, through the interaction and cross-loading of ideas from actors across the EU, environmental issues have become a key priority for the UK public. Further, the failure of domestic voluntary schemes to reduce pesticide usage has reinforced the campaign for legal controls. These institutional elements support strict regulations and will therefore serve as a constraint to dismantling the neonicotinoids ban.

Additionally, the EU's strict import tolerance level implies that divergence from the ban will restrict UK's export to the EU. Also, since the non-regression clause of the TCA applies to this ban, dismantling it may attract retaliatory restrictions from the EU. Further, given that the NI remains in the EU regulatory regime, divergence from this ban may lead to internal inconsistency in the UK market. The strictness of the EU ban, the non-regression clause and the NI protocol intensify the Brussels' effect to pull the UK towards the EU's regulatory regime. The pressure from the EU for the UK to adopt the ban will therefore be 'strong'. Moreover, given that most of the major trading partners of the UK allow the use of neonicotinoids, there will be strong global pressure on the UK to dismantle the ban.

Combining all these variables – balanced stakeholder preferences, institutional orientation for strict environmental measures, the strong Brussels effect, and high global pressure to dismantle – the analysis suggests that the UK will maintain the ban to avoid trade restrictions from the EU and safeguard its internal market. However, it seems likely that it will diverge from hazard-based precautionary restrictions in the future. The UK is likely to balance socio-economic factors such as productivity and food security with environmental concerns and engage in market-based regulatory measures rather than legal control instruments in future regulatory decisions. In effect, the UK will diverge from the EU pesticides regulatory regime 'by default' post-Brexit.

7.10 Chapter Summary and Conclusion

The main objective of this chapter was to assess the possibilities and challenges for the de-Europeanisation of the UK's agri-food regulatory regimes. The chapter analysed the essential parts of the EUWA, the NI Protocol and the UK-EU TCA for the post-Brexit agri-food regulatory relationships between the UK and the EU. It also analysed the opportunities, drivers, and constraints to dismantling the selected regulatory regimes, the ban on chemical PRTs, restrictions on antibiotics, and the ban on neonicotinoid pesticides. The analysis focused on the perspectives of the major stakeholder groups, domestic institutions, the Brussels effect and global economic relations as the determinants of the UK's de-Europeanisation decision.

The analysis showed varied views and preferences among the stakeholder groups from each regime. In the case of the ban on chemical PRTs and the AGP, the chapter found no significant opposing coalition or stakeholder group against those regulations. Most stakeholder groups admit that the restrictions or the regulations correspond to higher food safety and animal welfare standards and should be maintained post-Brexit. There appeared to be a general agreement among them on restricting imports from countries with lower standards to protect local producers from being out-competed by cheaper imports.

Concerning prophylactic antibiotics and the neonicotinoids' ban, there appeared an opposing perspective among the stakeholder groups. The first group, comprising farmers, producers and industry groups advocate on a socio-economic basis. They argued that stricter regulations often have severe socio-economic implications, such as lower productivity and food shortages, which are often given less attention in the overall impact assessment. Therefore, they advocate for voluntary and market-led regulatory measures that will allow producers to use the prohibited products sustainably rather than the 'blanket' ban. The other group, which comprises environmental NGOs, CSOs and consumer groups, advocates for legal controls. This coalition contends that voluntary control measures are ineffective in addressing AMR and the impending environmental breakdown. Therefore, they advocate for retaining EU restrictions and propose tighter regulations post-Brexit.

Also, the chapter revealed that in the regimes such as food safety and animal welfare, where the adaptation pressure and degree of Europeanisation were low, the domestic institutional and organisational arrangements supported an alignment with EU regulations. For instance, in the case of the PRT and the AGP ban, the government and all the stakeholder groups had established domestic structures that could sustain the ban. However, in regimes such as the pesticides and animal health (veterinary medicines), where the degree of adaptation and Europeanisation were relatively higher, some form of 'institutional layering' emerged – in which some elements served as drivers and other elements served as a constraint to dismantling. For example, in the prophylactic antibiotics and neonicotinoids ban, because of the UK government's preference for voluntary measures, it had put in place industry-led and public-private schemes that warrant the dismantling of the ban. However, the historical institutional path created by the decades of harmonisation and Europeanisation served as a drive to maintain the ban. To illustrate, the larger section of the UK public became accustomed to higher environmental and food standards. Consequently, they will use the EU standards as the yardstick to measure the progress of the UK's food standards.

The chapter also demonstrated that the Brussels effect has a varying impact on the regimes. First, the Brussels effect was conceptualised in this study as a function of market size,

propinquity, and stringent rules. However, the chapter showed that by making all the other factors constant, the stringency of EU regulation determines the intensity of the Brussels effect. In other words, the pressure from the EU for the UK to remain aligned depends on whether the regulation requires exporting countries to comply fully or not. For instance, in the cases of the PRT and the AGP bans, which required both local producers and exporting countries to comply, the Brussels effect was relatively stronger than the prophylactic antibiotics and neonicotinoids, which did not require exporting countries to comply.

The chapter also showed that the non-regression clause of the UK-EU TCA and the NI Protocol reinforces the Brussels effect to serve as a constraint to dismantling. The non-regression clause demands that the UK does not lower its standards below the level at which it left the EU. This clause was a constraint to dismantling the PRT, AGP and neonicotinoids ban, unlike the prophylactic antibiotics restrictions that came into effect after Brexit. The NI protocol also became a constraint to the dismantling or divergence from all the EU regulations for two interrelated reasons. First, given that the NI remains under the EU's regulatory regime, any form of divergence from the EU will lead to regulatory differences and inconsistency within the UK's internal market. This divergence might create a regulatory border between GB and NI, depending on the stringency of the regulation. Additionally, divergence will place an unequal regulatory burden between producers in GB and NI.

Further, this chapter demonstrated that international trade agreements, rules and standards such as the WTO's SPS and TBT, Codex and OIE standards, and FTAs with non-EU countries have a varying effect on the UK's dismantling decision. In almost all the cases, the EU/UK regulations were stricter than the global standards. Given the SPS and TBT agreements which require WTO members to justify regulations above the global standards scientifically, it will be a challenge to prove the hazard-based regulations such as the PRT, neonicotinoid and prophylactic antibiotic ban. Moreover, almost all the major trading partners of the UK oppose all the selected regulatory cases. The demand to remove all forms of trade barriers to facilitate free trade deals serves as a drive to dismantle these regulations.

In conclusion, the chapter confirms that the EUWA and the UK-EU TCA offer the UK the scope for de-Europeanisation or the mandate to take a new regulatory path. However, there are several other drivers and constraints that will determine the regulatory pathway that will be taken. As summarised in table 5.1, the analysis suggests that there will be no dismantling decision on the ban on PRTs and AGPs post-Brexit; thus, the UK is likely to align with the EU concerning those regulations. This decision will be supported by the strong domestic coalition for the ban and the 'very strong' Brussels effect, which serves as a constraint to dismantling. The primary constraint to retaining those bans will be international trade rules and the pressure from other trading partners. However, the benefits of aligning with the single market will outweigh the FTA with third countries since the EU is the closest and the largest trading partner of the UK.

Concerning the ban on prophylactic antibiotics and neonicotinoids, the analysis suggests that the UK will dismantle it 'by default'. Thus, the UK will intentionally not apply or adopt any further actions related to the EU regulations post-Brexit. In the case of preventative antibiotics, which has not been transposed into domestic law, the UK will likely not implement the regulation at all. However, for the neonicotinoids ban, the UK is likely to maintain it in its current state but may diverge from any future restrictions from the EU. These decisions will be influenced by the equally strong opposition to the restrictions (balanced perspective of stakeholders), relatively weaker Brussels effect and the strong global drivers for dismantling.

Table 7.1: Possibilities for Regulatory Divergence and the Expected Outcomes

	Stakeholders' Preferences (+)	Domestic Institutional Drivers (+)	Brussels Effect (-)	Global Drivers (+)	Expected Outcome
PRT Ban	**Low** No significant advocacy coalition against the ban.	**Very Weak** Domestic institutional arrangements support strict food safety and animal welfare regulations.	**Very Strong** EU regulation on PRT is stringent on imported goods. The non-regression clause of the TCA applies to the PRT ban.	**Very Strong** The UK/EU standard is higher than the international (CODEX) standards. Most of the UK's major trading partners outside the EU oppose the ban.	**No Dismantling Decision/Alignment** The UK is likely to retain the PRT ban. The major constraint will be from global trading partners. However, the benefits of gaining access to the EU market will be higher than the other trading partners
AGP Ban	**Low** No significant advocacy coalition against the ban.	**Weak** Domestic institutional arrangements support strict animal welfare regulations.	**Very Strong** EU regulation on AGPs is stringent on imported goods. The non-regression clause of the TCA applies to the AGP ban.	**Moderate** The UK/EU standard is higher than the international (OIE) standards. Most of the UK's major trading partners outside the EU are moving towards the phasing out of AGPs.	**No Dismantling Decision/Alignment** The UK is likely to retain the AGP ban. The Brussels' effect will be stronger for the ban than the global drivers for dismantling. The UK will align with the EU to gain full market access post-Brexit.

Prophylaxis Ban	**Balanced** Existence of two opposing coalitions: one for and the other against the ban.	**Strong** Domestic institutional arrangements support voluntary measures to legal controls.	**Moderate** EU regulation on prophylactic antibiotics is not stringent on third countries. The non-regression clause does not apply to this ban. Dismantling will lead to internal market/regulatory divergence between GB and NI.	**Very Strong** The UK/EU standard is higher than the international (OIE) standards. Most of the UK's major trading partners outside the EU oppose the ban.	**Dismantling by Default** The UK is likely to diverge from the prophylaxis ban by adopting voluntary measures post-Brexit. Subsidies and other economic incentives may be used to address the internal market/regulatory differences.

Neonicotinoids Ban	**Balanced** Existence of two opposing coalitions: one for and the other against the ban.	**Moderate** Historical Preference for market-based controls and voluntary measures. Rising environmental concerns culminating in demands for stricter measures	**Moderate** EU regulation on neonicotinoids is not stringent on third countries. The EU has a very low import tolerance level for neonicotinoids. The non-regression clause of the TCA applies to this ban. Dismantling will lead to internal market/regulatory divergence between GB and NI.	**Very Strong** The UK/EU standard is higher than the international (Codex) standards. Most of the UK's major trading partners outside the EU oppose the ban.	**Dismantling by Default** The UK is likely to maintain the ban on neonicotinoids. However, it will diverge or refrain from adopting strict precautionary measures in the future. It is likely to pursue the path of pragmatic, market-based, and voluntary pesticide regulatory measures.

Source: Developed by the Author

CHAPTER EIGHT: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

8.1 Introduction

This chapter presents the summary of the results of chapters five to seven, sets out the main conclusions and makes recommendations for policy and practice. The chapter presents a summary of the findings, linking them to the objectives of the thesis and how it answered the research questions in Section 1.3. It also reiterates the contributions of the thesis to knowledge, provides an internal critique and suggests a future direction of research.

8.2 Summary of the Findings

The broad objective of this thesis was to assess the likely implications of Brexit on the UK's scientific advisory and regulatory regimes for agri-food governance, using the pathogen reduction treatment (PRT), neonicotinoid pesticides, and antibiotics restrictions as case studies. Theoretically, the thesis sought to investigate the implications of Brexit for the EU (dis)integration and (de)Europeanisation literature since this is the first and only time a Member State has left the EU. The research traced and analysed the evolution of the UK's agri-food regulatory regimes and the impacts of EU membership on domestic institutional arrangements, norms, and practices. It also traced and analysed the origins and development of formal and informal institutions for the selected regulatory regimes.

The analysis revealed that there had been substantial changes in the UK's institutional structures and regulatory processes since the adoption of the Single European Act (SEA) in 1986. One notable development across all the regimes was the emergence of a multilevel regulatory polity and the transfer of a significant proportion of risk assessment and regulatory functions from the UK to EU agencies. The EU agencies serve as a hub connecting all competent agencies and advisory systems of EU Member States within the new multilevel

regulatory framework. There was also an increase in the number and intensity of regulations originating from the EU in all the regimes. For instance, about 90% of EU food safety legislation before the 2000s focused mainly on setting MRLs in foodstuffs and the hygiene of final products. However, the regulatory scope was broadened after the reforms to cover the entire value chain – from farm to fork. Additionally, the dynamics of regulatory politics changed substantially as domestic actors navigated other channels, such as forming alliances with other EU member states, to enhance their participation in the regulatory governance processes. These findings were consistent with other scholarship, which contends that the process of Europeanisation led the EU to become a 'regulatory state' (Lodge, 2008; Majone, 1997; 1994) – entailing the creation and delegation of significant powers to supranational agencies and making the EU the locus of regulatory power.

The thesis showed a varying degree of Europeanisation or a varied effect of regulatory harmonisation on the UK's domestic regimes. In the case of food safety and animal welfare, the thesis demonstrated that the UK and the EU moved in a similar direction; therefore, the adaptational pressure and the degree of Europeanisation on these regimes were 'low'. However, in the case of pesticides and antibiotics regulatory regimes, the UK had a divergent policy outlook – a preference for voluntary and market-based measures – compared to the EU's precautionary and rule-based policy style. Thus, although the UK had a similar organisational structure to the EU, it had to adjust its policy regimes to adopt EU regulatory measures. Therefore, the degree of Europeanisation for both cases was 'moderate'. Following Thatcher's (2004) conceptualisation, it could be inferred that the UK became a 'winner' in food safety and animal welfare and a 'loser' of Europeanisation in veterinary medicines and pesticide regulatory regimes.

The thesis also assessed the implications of Brexit and the new UK-EU relationships on prospective regimes for agri-food governance and sustainability in the UK. It analysed the perspectives of stakeholder groups toward the existing EU/UK regimes and their preferences

for future alignment or divergence from the EU. Additionally, it examined the possible constraints, drivers, opportunities, and challenges to dismantling EU regulations post-Brexit. The analysis showed the emergence of a coalition of actors in each of the regimes, either for or against dismantling EU regulations. In the case of the ban on chemical PRTs and the AGP, there was a near-consensus among the major stakeholder groups to maintain the ban. In addition, most stakeholder groups called for stricter restrictions on the importation of PRT and AGP-treated products to protect local producers from being out-competed. However, for the ban on prophylactic antibiotics and neonicotinoids, there were opposing coalition groups. The groups that advocate dismantling the EU ban argue that stricter regulations have adverse socio-economic implications, such as low productivity and food shortages. The other groups contend that voluntary control measures are ineffective in addressing the impending environmental breakdown. Therefore, they advocate retaining EU restrictions and propose tighter regulations post-Brexit.

The analysis revealed that in the regimes such as food safety and animal welfare, where the adaptation pressure and degree of Europeanisation were low, the domestic institutional and organisational arrangements supported an alignment with EU regulations. However, in regimes such as pesticides and veterinary medicines, where the degree of adaptation and Europeanisation were relatively higher, multiple layers of institutions appeared, some of which supported dismantling and others opposed. The opposition to dismantling that has arisen in some of the regimes illustrates some of the historical institutional legacies left by Europeanisation, which will potentially affect domestic regulatory politics post-Brexit. First, some domestic actors, especially the environmental and consumer groups, have become accustomed to the EU's strict rules. Some domestic actors have also maintained their alliance with EU groups, which will enable them to compare and contrast the future directions of the UK with the EU and also bring the EU's courses of action into domestic discourse.

The findings also suggested that the larger market size of the EU and the high supply chain linkages – caused by geographical proximity and decades of market integration – provide an economic incentive for the UK to remain aligned with the EU. As discussed in chapter six: the EU remains the largest market destination for the UK's agri-food products; secondly, supply chains are not quick-fix to reinvent in a short time; also, some agri-food products such as dairy and dairy products are perishable, and therefore, require shorter supply chains to maintain their quality. Following the rational choice institutionalist 'logic of consequences', it will be economically prudent for the UK to align with the EU to gain the full advantages of the EU market and avoid the challenges of reinventing supply chains. Further, the analysis showed that the UK-EU TCA gives the UK 100% access to the EU's single market, subject to the non-regression and the rules of origin clauses. The NI protocol also keeps Northern Ireland in the EU regulatory regime, which means GB products need to meet EU standards before they can be sold in the NI market.

The analysis demonstrated that the historical legacies left by Europeanisation, the non-regression clause of the UK-EU TCA, the NI Protocol and the larger market size of the EU will reinforce the Brussels effect to serve as a constraint on dismantling. On the other side, international treaties and trade agreements will be a driver to dismantling in almost all cases since the EU/UK regulations were stricter than the global standards. Combining all the internal and external drivers, constraints, and stakeholders' preferences, the analysis suggests that the UK would likely dismantle prophylactic antibiotics and pesticide regulations 'by default'. However, in the case of PRT and AGPs, the findings suggest that there will not be any dismantling decisions. The determining factor of the dismantling decision will be the 'stringency' of EU regulations – that is, whether the EU regulations bind non-member state selling in the single market or not.

The thesis also examined the challenges and opportunities that Brexit presents to existing advisory and regulatory regimes for agri-food governance in the UK. It analysed the strength

and capacities of the UK's scientific agencies to produce proactive evidence to support regulatory decisions post-Brexit. The analysis revealed that the institutional capacities of the UK's scientific agencies, in terms of research funding and expertise, weakened significantly in the decade before Brexit. However, the government has taken considerable measures immediately after Brexit to address the shortfalls. Notably, the government increased its overall funding for R&D substantially by £1.75 billion and has made alternative domestic research funding arrangements in case the negotiations to join the EU R&D framework, Horizon Europe, fail. The staff strength of domestic departments has also been enhanced significantly to take in the responsibilities being transferred from the EU and other Brexit-related charges. The UK has also made alternative arrangements to join other global networks and data sharing agencies, such as INFOSAN, to replace the EU intelligence sharing database such as RASFF.

The analysis revealed some shortfalls in the UK's arrangements to address the capacity challenges post-Brexit. First, in terms of funding, there was no clarity on the areas in which the current funding stream cover and longer-term funding strategies. There is also the challenge of getting the right level of expertise in the right areas to deal with the immediate post-Brexit issues. Additionally, the findings suggest UK scientific agencies may face the challenge of internal coordination. First, because Northern Ireland operates under EU regulatory regimes, there might be different procedures and principles of risk analysis if the UK diverges from the EU. Also, because agri-food policies are devolved, there will be coordination challenges if different administrations take different regulatory policy paths. The analysis showed that the UK Internal Market Act 2020 only ensures that regulatory differences do not impede the free flow of goods within the UK; however, it does not address or prevent internal divergence. The findings also suggested that the voluntary data sharing networks will not be sophisticated enough to replace the RASFF and other EU intelligent databases. Therefore, UK institutions are likely to experience data gaps, which will affect their capacity to deal with new threats along the global agri-food supply chains.

The thesis demonstrated that Brexit presents both challenges and opportunities to the integration and use of scientific evidence in the post-Brexit regulatory regimes. Tracing back to the Salmonella scares and BSE crisis, the perceived interference from the industry and the government on risk assessment was regarded as the major cause of mistrust of scientific expertise in the UK. The James report and the Philips inquiry suggested a strict separation between risk assessment and management. The EU put in place institutional and functional separation of risk assessment and management practices to ensure the independence of scientific institutions, however, in the UK, there is only a functional separation but no institutional separation. The lack of institutional separation could increase public perception of government interference leading to mistrust and legitimacy challenges post-Brexit. The analysis further showed that there were concerns about the 'politicisation' of evidence and risk management processes, mainly as a result of the number of actors involved in the regulatory decision-making, scientific uncertainties, and the misconstruction of policy problems.

8.3 Contribution to Knowledge

This thesis contributes to the collective knowledge and understanding of the process and the outcome of Europeanisation. First, most of the existing literature assumes that Europeanisation takes a linear path in the form of downloading, uploading, or cross-loading. This conceptualisation portrays the EU as a distinct polity separate from the Member States – in which institutional processes occur independently and the results are downloaded, uploaded or cross-loaded. However, by utilising the new institutional theory, this thesis demonstrated that Europeanisation could also take a co-evolutional path – where multiple actors across each level operate in an interactive web such that the respective institutions become dynamically codetermined. To illustrate, the thesis showed that the EU/UK food safety regulatory regime co-evolved out of the 1990s safety crises and was co-determined by

mutually dependent institutional processes across the UK and the EU. This approach helps to understand the full dynamics and the role of different actors in the Europeanisation process.

Also, a remarkable amount of research has emerged since the Brexit referendum in 2016 to analyse the future regulatory relationships between the UK and EU (Burns et al. 2016; Cygan 2020). However, most of these studies do not integrate the full range of factors, such as global and other external factors, that may affect the UK's decision to diverge or align with the EU regimes. For instance, Burns et al. (2016) and Cygan (2020) focus mainly on historical institutional paths created by the EU membership to analyse the possibilities of alignment or divergence from the EU policy regimes. This thesis refined the concepts of dismantling and de-Europeanisation to integrate the broad perspectives of stakeholders with internal and external institutional drivers and constraints and how they would affect the future alignment or de-Europeanisation decisions. This approach puts the analysis in the real-world decision-making context involving globalised actors and institutions. Thus, this model will be useful in drawing an analytical generalisation of other sectors and the relation between the EU and the other Member States that might leave the Union.

The thesis refined and extended the concept of the 'Brussels effect' to analyse the influence of the EU on countries post-Membership. The Brussels effect has emerged in recent literature as a theoretical concept to explain the rise of the EU as a regulatory hegemon (Bradford, 2020; 2012). It is used as an analytical tool to explain and predict how the EU attracts non-member countries to adopt its regulatory standards. In addition to Bradford's (2020) five factors – market size, regulatory capacity, stringent standards, inelastic targets, and non-divisibility – this thesis demonstrated that propinquity, defined by the historical, economic, socio-political, and geographical proximity of the UK to the EU, reinforces the Brussels effect.

As discussed in chapter six, the decades of Europeanisation and geographic proximity caused the supply chains of the EU and UK to be more integrated, which in turn draws UK producers to the EU market more than elsewhere. The post-Brexit economic and political agreements

between the UK and EU – the NI Protocol and the UK-EU TCA – further draw the UK closer to the EU regulatory regimes. First, the NI Protocol places Northern Ireland under the EU regulatory regime, meaning divergence from certain EU regulations will mean GB products could not be sold in the NI market. The non-regression clause in the UK-EU TCA also binds the UK from departing from certain regulations or lowering its standards below the level at which the UK left the EU. Drawing on these findings, the thesis suggests that the Brussels effect is not uniform across all countries. The proximity of a country to the EU – economically, politically, and geographically – affects the intensity or the strength of the Brussels effect. Although the thesis used a single case of the UK, the argument is valid based on the presence or absence of the variables specified. For example, the Brussels effect on the UK would not be the same if the UK did not have an integrated supply chain with the EU or if it had no TCA with the EU or if there was no NI Protocol in place. The introduction of propinquity will be useful in future studies using the Brussels effect on a bilateral basis or comparing the effect on different countries.

Also, the majority of the empirical studies that explore the relationship between informal institutions and evidence-informed policymaking adopt a static approach or spatial comparisons. For example, most works focus on the transatlantic regulatory differences between the EU and the US (Lalor & Wall, 2011; Drezner, 2005; Löfstedt & Vogel, 2002). Using historical institutionalism, this thesis illustrated how the conception, framing, discourse, and use of evidence in regulatory policymaking vary with time. For instance, the thesis illustrates how the food safety crises and EU membership affected the framing and the use of evidence in regulatory governance in the UK. Over time, the EU/UK moved from hazard-based to risk-based assessment of novel foods and products with the adoption of the precautionary principle as the prime instrument of uncertainty management. Bringing in 'temporal' dimensions of institutional variables enables us to reflect on whether certain technologies, evidence or decisions would have been taken or avoided in the past or the present and also enables us to predict the future dynamics.

8.4 Internal Critique and Recommendations for Future Research

The findings, predictions and recommendations of this research are based mostly on the data, arrangements and agreements between the UK and the EU as of December 2021. However, most of the deals, including the NI Protocol and the TCA, are very fragile – meaning they are subject to constant review, and as such, they could be repealed abruptly. For instance, at the time of writing – between January 2022 and July 2022 – there was a contention over the UK government's attempt to change some aspects of the NI protocol, such as border checks on goods from Great Britain (GB) to Northern Ireland (NI).[352] Additionally, the UK's participation in Horizon Europe and other EU networks remain quite uncertain. These fluidities and uncertainties surrounding the post-Brexit arrangements can potentially lower the inferential and predictive power of this research.

Also, the research focused mainly on the decision-making aspect of the regulatory regime and excluded other important aspects such as implementation, compliance, and monitoring. However, all the other parts may have some causal sequence that potentially affects the operations of the entire regime. For instance, a reduction in the strength and capacity of the monitoring and enforcement agencies would have a knock-on effect on risk assessors and managers in terms of getting the right information needed for evaluation and detecting new threats. Additionally, the monitoring and enforcement departments, such as the border inspection, play a crucial role in executing the UK-EU TCA and the NI protocol. Therefore, future research that integrates all the critical sections of the regime will be essential to enhancing the post-Brexit regulatory governance in the UK.

Another area of this research which could be developed further in the future is to test and compare the Brussels effect on other sectors, policy areas and regulatory regimes. Although

[352] *See* BBC (June 13, 2022). NI Protocol: UK reveals plans to ditch parts of EU Brexit deal. https://www.bbc.co.uk/news/uk-politics-61790248; BBC (June 27, 2022). Brexit: What is the Northern Ireland Protocol?; https://www.bbc.co.uk/news/explainers-53724381; See BBC (May 17, 2022). Northern Ireland: Could the EU and UK face a trade war? https://www.bbc.co.uk/news/business-61466142

this research used three cases, antibiotics, chemical PRTs, and neonicotinoids, which reflect and represent the broad spectrum of the agri-food sector. The inclusion of other regulatory areas may offer new insights into how the Brussels effect may affect the sector in the future. Additionally, a comparative assessment with other sectors may help elucidate the whole dynamics of the EU's influence on the UK's regulatory regimes, which could, in turn, help identify other mediating or constraining factors of the Brussels effect or de-Europeanisation.

8.5 Recommendations for Policy and Practices

Based on the analysis and the findings, the thesis makes the following recommendations for policy and practices to help enhance evidence-informed agri-food regulatory governance in the UK post-Brexit. First, the thesis recommends a comprehensive and sector-specific R&D funding policy to ensure that the right and stable proportion of the budget is allocated to important areas of the sector in the long-term period. The discussions in sections 5.2, 7.3 and 7.9 illustrate that R&D funding is essential in the design of a proactive regulatory regime. The findings revealed that the R&D expenditure for the main departments in charge of the agri-food sector declined significantly in the decade before Brexit. Although the UK government has expressed the intention to increase its overall R&D budget for the next decade, the proportion available to the various sectors is not explicit. The thesis proposes that long-term sector-specific R&D strategies will enhance the proactiveness of departments and agencies in charge of agri-food governance.

Further, the analysis in chapters six and seven demonstrated that institutional coordination between the devolved administration and policy coherence among different agencies would be essential to the functioning of the UK's internal market. Currently, trade policy is an area of responsibility of the UK national government, whereas agricultural and food policies are under the remit of the devolved administrations. This arrangement could create conflicts and inconsistency in the internal market if the national engages in trade policy that is incongruous

with agri-food policies at the devolved level. For instance, if Scotland decides to ban prophylactic farm antibiotics but the UK national trade policy supports the importation, it will put Scotland's farmers at a disadvantage and eventually affect the internal market's consistency. Therefore, the study recommends an integrative and coherent approach to agricultural and trade policies. A joint platform should be created to bring all the agri-food policy goals of the devolved nations together with trade policy to identify and address trade-offs and synergies to guide them in a common direction.

The study also recommends an institutional separation between risk assessment and management in the post-Brexit regulatory regimes in the UK. One of the key recommendations of the James report and the Philips inquiry was to make a clear distinction between risk assessors – who will be in charge of scientific evidence and risk assessment – and risk managers – who will be responsible for making regulatory policy decisions. With the creation of EFSA, the EU adopted a strict institutional separation between scientific assessment and management, whereas the UK model entails only a functional separation between the two. This thesis contends that the EU model – where all scientific risk assessment functions are given to one independent agency – will help strengthen the scientific advisory system and the regulatory process. Principally, institutional separation will help minimise public perception of government interference in the scientific advisory mechanisms, which will, in turn, enhance credibility, legitimacy and trust in the regulatory regimes.

The analysis in sections 7.9 and 7.10 confirms that agri-food regulatory decision-making in the past decades has been heavily politicised, involving multiple actors and lobby groups with 'competing facts'. In almost all the cases studied, there were reports of misconstruction or misunderstanding of the actual policy problem. For instance, in the case of farm antibiotics and neonicotinoids, some sections of the public were protesting based on residues and public health, while the issue was actually about the environment. The thesis, therefore, recommends an intensification of public participatory forums and the strengthening of science communication strategies to enhance public understanding of regulatory issues. Currently, the

FSA engages in an open and transparent risk assessment process by allowing members of the public to attend their meetings as observers. This thesis contends that, beyond openness and transparency, a participatory forum would ensure that the perspectives of all major stakeholders, including norms and values, are considered to help identify synergies and trade-offs. Additionally, there should be a robust science communication strategy to constantly engage the public about policy development – including the evidence gathered and the direction they are pointing to at each particular point. This could be achieved using the traditional mainstream media and social media to reach out to diverse audiences and counter the propagation of 'fake information' among the public.

8.6 Conclusion

This research assessed the implications of Brexit for expertise, evidence, and agri-food regulatory governance in the UK. The thesis demonstrated that the UK's agri-food regulatory regimes had been considerably Europeanised in recent decades. This was evident with the emergence of multilevel regulatory polities with EU agencies serving as the hub. A significant amount of regulatory responsibility was also transferred to EU institutions, weakening the strength and capacities of the UK's domestic agencies. The harmonisation of regulatory regimes and the single market also led to the integration of supply chains between the two blocs. Additionally, through cross-loading and downloading, some EU norms and practices have been embedded in the UK's formal laws and informal regulatory culture. For instance, the analysis confirmed that the EU's precautionary and risk-based approach to food safety and pesticide governance have been embedded in some UK institutions through the transposition of the direct and the derived EU regulations into domestic laws. Also, some stakeholders, especially, the environmental and the consumer groups have become accustomed to the strict EU rules and will therefore use them in future regulatory and political discourse to compare and contrast different regulatory options.

The thesis demonstrated that Brexit, the EUWA and the new UK-EU TCA serve as a critical juncture for the future trajectory of the post-Brexit UK's agri-food regulatory regimes. That is, the new arrangements present an opportunity for the UK to take a new institutional or regulatory path. However, the analysis suggests that the larger market size of the EU, the historical institutional paths created by the decades of Europeanisation, and the stringency of some EU regulations will reinforce the so-called Brussels effect to draw the UK closer to the EU after Brexit. Relating to the new institutionalists' logic of appropriateness and the logic of consequentiality, the study found out that some stakeholder groups were willing to maintain some of the strict EU regulations to pursue their rational goal driven interest. For instance, the analysis showed that majority of supermarket chains and farmers' groups were willing to maintain the PRT and AGP ban post-Brexit to appeal to the demands of their customers – who have become accustomed to strict food safety standards.

The thesis also confirmed that the decades of Europeanisation caused the EU to become a 'regulatory state' serving as the hub of almost all regulatory activities. It will take the UK a long time to build sophisticated networks and databases such as RASFF and EARSNet. The analysis found out that most stakeholder groups in the UK, including farmers, consumers and environmental groups support the UK aligning with these regulatory infrastructures. Additionally, the large market size of the EU and the integration of supply chains also attracts UK local producers to comply with EU standards in order to sell into the EU market. Also, Northern Ireland remaining in the EU regulatory regime means that producers in Great Britain will not be able to sell in Northern Ireland if the UK diverges from 'stringent' EU rules such as AGP and PRT. The findings show that there will be a *de facto* alignment with EU in areas where the EU has stringent rules, that require exporting countries to comply, as local producers will continue to adhere to EU regulations in order to export and also sell locally. The findings also suggest that the inability of NI to import from GB has serious social and political ramifications including food security.

In conclusion, the thesis demonstrates that Brexit present a unique opportunity for the UK to dismantle or diverge from EU's agri-food regulatory regimes. However, the historical institutional paths created as a result of Europeanisation, and the socio-economic rationality goal driven action of domestic actors will lead to a *de facto* alignment with the EU. The degree of alignment, in the short to medium term, will depend mainly on the stringency of EU rules – that is, the more stringent the EU rules, the greater the alignment.

APPENDICES

Appendix I: Invitation Letter to Participants

I am a PhD student at the Grantham Centre for Sustainable Futures and the Department of Politics, University of Sheffield. My research seeks to explore the changing dynamics of agri-food advisory mechanisms and the future relationships between EU and UK scientific agencies after Brexit. The project also aims to explore the perception of stakeholders and policy actors towards the existing regulatory regimes for Antimicrobial Resistance (AMR), Food Safety, and Pesticide regulations.

As part of the research, I intend to speak to experts, stakeholders, and policy actors in the agri-food sector to explore: (1) their perception of the existing regulatory regimes; (2) the challenges and opportunities that Brexit presents to the advisory and regulatory regime; and (3) how to enhance the advisory system to ensure sustainability in the sector, post-Brexit. You were identified as a key contact given your experience and current position as...or expertise in…

I would like, therefore, to invite you to participate in an online interview which will take a maximum of one hour – this can, however, be adjusted to suit your availability. Participation in this research is voluntary, and you would be free to withdraw at any time before the conclusion of the project (without giving any explanation). The project has been ethically approved via the University of Sheffield's Ethics Review Procedure, administered by the Department of Politics. Copies of the participant information sheet and the consent form have been attached to this email for your consideration.

Appendix II: Participant Information Sheet

You are invited to take part in a research project. Before doing so, it is important that you understand why the research is being done and what it will involve. Please read the following information carefully. Ask the researcher if anything is not clear or if you would like more information. Thank you for reading this.

About the project

The UK's agri-food regulatory system, in the proceedings of Brexit stands at a very critical point in terms of its future trajectory. This is because, the sector has long been harmonised and operated within the policy and institutional framework of the European Union (EU). For instance, key EU institutions like the European Food Safety Agency (EFSA) has been the major source of scientific evidence to support regulatory policy decisions since its creation, two decades ago. Now, in the scheme of Brexit, UK may be disentangled from this institutional and policy regime.

This interdisciplinary research seeks to assess the broad implications of Brexit on the agri-food regulatory regime, focusing on expertise, and evidence production, integration and use. The research is relevant in its attempt to propose measures to strengthen post-Brexit regulatory governance in the agri-food sector. Firstly, the project seeks to explore the changing dynamics of the advisory mechanism and interrelationships – including the concentration of influence and level of coordination – among institutions and agencies within the existing regime. This understanding will aid policymakers to identify agencies that need strengthening to deliver high-quality evidence to support regulatory governance in the sector after Brexit. The project also seeks to understand the interaction between advisory bodies and other policy actors – including the blurry boundaries between formal advisory structures and the influence of informal norms in regulatory decision-making. This detail will aid in addressing the contention and complexity involved in the use of scientific evidence in regulatory policy decisions in the UK. Finally, the study seeks to assess the perspectives of stakeholders toward

the existing regulatory regime. This understanding will also be vital in co-producing a framework necessary to enhance the utilisation and integration of scientific evidence in regulatory policy decisions in the UK, post-Brexit.

Why have I been asked to participate?

As part of the research we would like to speak to stakeholders and policy actors in the agri-food sector, to explore: (1) their perception towards the current regulatory regime; (2) the challenges and opportunities that Brexit presents to the advisory and regulatory regime; and (3) how to enhance advisory system to ensure sustainability in the sector, post-Brexit.

You have been identified as a key contact within [name of partner organisation] to participate in this aspect of the research, on the basis of your position in research or policy and your specific expertise in the topics we are focusing on.

Do I have to take part?

No – it is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form, or give verbal consent. You do not have to answer any questions you do not feel comfortable with and can withdraw from the research at any time without giving a reason.

What will taking part involve?

You are invited to take part in an interview, which we anticipate will take a maximum of one hour, though this can be adjusted to suit your availability if necessary. With your permission, the discussion will be audio recorded. The recordings will then be transcribed and used to inform our analysis and writing.

What will happen to the results of the research project?

The information you provide will be analysed and used in the final Ph.D. thesis of the researcher. It will also be used in other academic writing, including journal articles. We will be

ready to give you the opportunity to comment on any use of data that is identifiable to you ahead of publication.

In addition, the data may be used as part of subsequent research. Due to the nature of this research, it is likely that other researchers may find the data collected to be useful in answering future research questions. We will ask for your explicit consent for your data to be shared in this way, and if you agree, we will ensure that the data collected about you is untraceable back to you before allowing others to use it, including through any redaction that is needed for this.

Will my taking part in this project be kept confidential?

The information you provide will be stored securely on the University of Sheffield computing systems. We do not intend to cover any sensitive issues, but in the event that any such information does emerge, we will treat it with appropriate sensitivity. The audio recordings made during this research will be used only for analysis, and no one outside the project will be allowed access to the original recordings.

As outlined above, the results of the study will be written up and published. When completing the consent form (or in verbal consent), you will be given three options for the permission you give for us to use your information: without anonymisation; with limited anonymisation (assigning a pseudonym and withholding detailed information which might make you easily identifiable); or no permission to reproduce your individual data in publications.

Further information

If you have any questions or concerns about the research before or after taking part, please contact a member of the research team.

Appendix III: Participant Consent Form

Please tick the appropriate boxes	Yes	No
Taking Part in the Project		
I have read and understood the project information sheet dated ___/___/_____ or the project has been fully explained to me. (If you answer No to this question please do not proceed with this consent form until you are fully aware of what your participation in the project will mean.)	☐	☐
I have been given the opportunity to ask questions about the project.	☐	☐
I agree to take part in the project. I understand that taking part in the project will include being interviewed and audio recorded.	☐	☐
I understand that my taking part is voluntary and that I can withdraw from the study at any time; I do not have to give any reasons for why I no longer want to take part and there will be no adverse consequences if I choose to withdraw.	☐	☐
How my information will be used during and after the project		
I understand my personal details such as name, phone number, address and email address etc. will not be revealed to people outside the project.	☐	☐
I understand and agree that my words may be quoted in publications, reports, web pages, and other research outputs. I understand that I will not be named in these outputs unless I specifically request this.	☐	☐
I understand and agree that other authorised researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐
I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	☐	☐
I give permission for the interview that I provide to be deposited in the University of Sheffield Research Data Catalogue and Repository (ORDA) so it can be used for future research and learning	☐	☐
So that the information you provide can be used legally by the researchers		
I agree to assign the copyright I hold in any materials generated as part of this project to The University of Sheffield.	☐	☐

_____	_____	_____
Name of participant [Printed]	Signature	Date

_____	_____	_____
Name of Researcher [Printed]	Signature	Date

Appendix IV: List of Interviewees by stakeholder category

Stakeholder Category	Number of Interviewees	Pseudo Initials of Interviewees	Organisation
Government Departments and Agencies	4	G1	Food Standards Agency (FSA)
		G2	Department for International Trade (DTI)
		G3	DEFRA Committee on AMR
		G4	Agri-Food and Bioscience Institute (AFBI)
Civil Society Organisations (CSOs) and Non-Governmental Organisations (NGOs)	2	C1	Alliance to Save Our Antibiotics
		C2	The Chartered Institute of Environmental Health
Industries	2	I1	Crop Protection Association
		I2	Agricultural Industries Confederation (AIC)
Farmers' Groups and Associations	2	F1	National Farmers Union (NFU) Scotland
		F2	Ulster Farmers Union (UFUNI)
Scientists/Experts and Academics	15	S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12	Research and Higher Education Institutions

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